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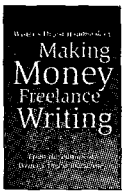

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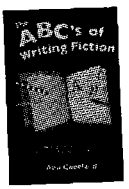

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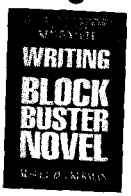

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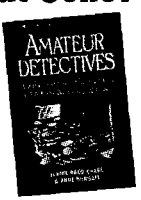

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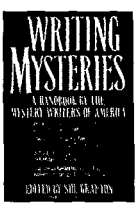

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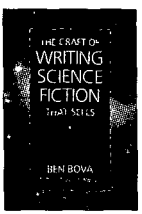

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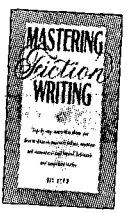

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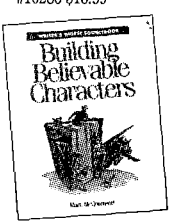

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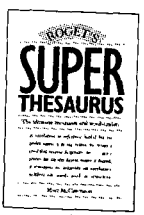

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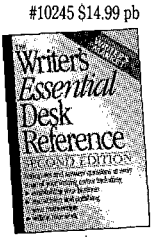

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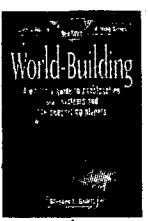

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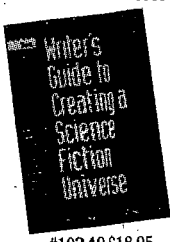

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137

Special Feature

THE VOICE OF AUTHORITY, Ben Bova ____ 176

Probability Zero

THE WORRY WART, Jeffery D. Kooistra ____ 82

Reader's Departments

THE EDITOR'S PAGE ____ 4
THE ANALYTICAL LABORATORY ____ 146
THE ALTERNATE VIEW, John G. Cramer ____ 182
THE REFERENCE LIBRARY, Tom Easton ____ 272
IN TIMES TO COME ____ 279
BRASS TACKS ____ 280
UPCOMING EVENTS, Anthony Lewis ____ 288

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Indicia on Page 5

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EDITORIAL Stanley Schmidt

THE ORPHAN EXPERIMENT

A while back (August 1996) Spider Robinson had a story in *Analog* called "Orphans of Eden." In it a visiting time traveler offers the narrator the knowledge gained from a certain future experiment, if he has the right opinion about the morality of the experiment.

The experiment? Its object is to determine what kind of society people might build if they could be freed from all the preconceived notions and attitudes and prejudices with which history has burdened everyone in our world. Such knowledge would not be a mere academic curiosity. Our world is full of ethnic antagonisms, like those in the Middle East and the countries formerly known as Yugoslavia, so deeply rooted in history that there seems little hope of eradicating them—unless all those things could somehow be forgotten, or a new culture founded by people who never knew them.

The method used by the experimenters in "Orphans of Eden," since everyone who has already grown up in an existing society has by definition already been affected by those things, is to start with people who have *not* grown up in any society. In the story's words[1], ". . . put a bunch of preverbal children—infants, for preference—in a congenial artificial environment. Plenty of room, plenty of food . . . mild climate, no predators, an adequate supply of useful materials and appropriate technology for later . . . immunizations . . . doctor-bots that will see them into adulthood and then fall apart . . . AI packages to teach language skills and basic hygiene . . . as semantically value-free as possible . . . basic principles of mathematics and science . . . and no history. Then you go away, and come back in a thousand years."

The emphasis in the story was on the morality of the experiment, given that the children used as "guinea pigs" were abandoned babies gathered from a wide range of times and places. Appropriately, the main impact of the story on most readers seems to have been to stimulate them to think about that. But it's also interesting to speculate on what the *results* might be if such an experiment were actually done. As reader Bernie Gallagher wrote, "I've often wondered, myself, what the outcome

[1]To close approximation—I've condensed and/or paraphrased slightly in a couple of spots as a compromise between clarity and length.

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would be to start a closed society from infants free of any social mores or customs. Would it evolve into a bias-free utopia, or would it ultimately digress back to what we have now?"

As often happens in such "either-or" dilemmas, neither extreme option seems to me particularly likely, or to exhaust the possibilities. Much more probable, I think, at least on anything other than a very long time scale, is a fairly basic "animal" society, except with more sophisticated communication abilities and understanding of their physical environment than most animals have. The original children, growing up, might know that the kumquats in their garden have something to do with reproduction of the trees they grow on, and that they can be food for humans; and they might know how to ask a neighbor to hand them one. But what are the relative chances of their *bothering* to ask a neighbor to hand them one, versus simply grabbing the one they find most attractive, even if someone else is already holding it?

I'm not sure, of course; I haven't done the experiment. But *our* history seems to show that social refinements such as consideration for the needs and feelings of others, or rules to enforce at least the appearance of such consideration, develop through long, slow, frequently painful evolution.

It has become fashionable in recent years to sneer at Columbus for moving in on the Amerindians, but a good case can be made that he and many of his contemporaries simply didn't know any better. (Some people still don't, though they have far less excuse.) Slavery used to be taken for granted as part of The Way Life Is, and it was viewed as "natural" that people of certain groups should be enslaved by those of certain others. The revulsion that most of us now feel for that view is a very recent, hard-won development—and *still* not universally shared. The idea that people who look different from you and have different habits are as human as you and should be treated as your moral equals is very subtle. It's quite hard to learn, if the opposite is already deeply ingrained in your thinking.

The hope of Spider's time-traveling experimenter, of course, is that the opposite—the belief that Others are Enemies—is not innate or "preprogrammed." Then maybe children who started out with nobody to teach them to hate and fear the different will not do so. However, I know of no

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reason to believe that tolerance and compassion are innate, either. The children in the experiment won't start as little angels who will grow up to be big angels because there's no cultural baggage to corrupt them. They will start as (relatively) blank slates, full of *neither* altruism nor prejudice—and with nobody to teach them *either*. Whatever they develop of those or any other cultural characteristics (conceivably including some we have not yet seen in *any* human culture) will have to evolve just as ours did. That process will probably take many, many generations.

How many? Spider's fictional visitor suggests waiting a thousand years to peek in the pot. In terms of our history, that sounds like a very short time to expect much, given where the children start. On the other hand, it may be more adequate than it first sounds. These children aren't starting from the same point our earliest ancestors were. They have a big head start in such areas as language and understanding of their world, and those—especially language—might also give them a head start in developing a social system.

But how much of a head start? Remember that their language was deliberately constructed to be "as value-free as possible." This implies that the children's robot teachers will *not* start them off with concepts like *good*, *bad*, *duty*, *courtesy*, *right*, *wrong*, or *honesty*. If they're going to have them—or substitutes that we don't know about—they'll have to evolve them through trial and error. That took our ancestors a long time.

I'm reminded of a class I once helped teach in which the professor in charge proposed to let beginning

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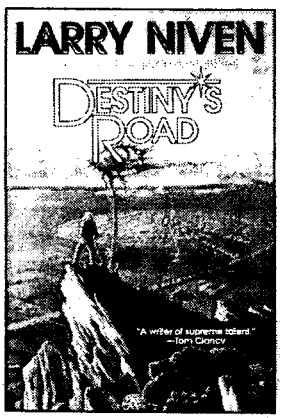

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physics students discover the concepts of physics largely on their own by playing around with lab equipment, with very little specific instruction or guidance. That, too, sounded like a fascinating experiment, but some of us were skeptical about how much it could actually accomplish in the time available. As one graduate assistant pointed out, "People had glass an awfully long time before they came up with the telescope."

Many psychological studies, and the experience of innumerable parents in a very wide range of cultures, suggest strongly that children begin life with an almost completely selfish outlook. They see themselves, quite literally, as the center of the universe. Given their experience to date, and the data inputs so far available to them, that's a perfectly reasonable working hypothesis. But they have to grow beyond it to live with other people. We don't know to what extent they could do that without cultural guidance, because we don't know anybody who's tried to do it that way. But in the cases we do know about, developing the ability to learn to live in harmony with other people depends heavily on deliberate nudging from people who've already done it.

We can't even claim that the first people didn't have such guidance, unless we accept the proposition that our species was created fully formed from essentially nothing. But there is too much evidence that we evolved from ancestors whom we would now consider other species, and that must apply as much to behavior patterns as to genetic make-up. Even if evolution moved by steps and plateaus, as many evolutionary biologists now believe, we all had parents. And, at least by the time our ancestors were primates, those parents had a lot to do with how their offspring grew up.

Then there's the matter of those computers. The babies in Spider's time traveler's experiment aren't *really* on their own. The teaching AIs and doctor-bots function in some senses as parents would, and the children may "imprint" on them, seeing them *as* parents. But the robots only do *some* of what real parents would. In "normal" cultures, the first human interaction people have is with their parents, and it is through those interactions that they begin to learn and practice how to interact with other human beings. If those first, formative interactions are instead with robots that have been carefully designed to *avoid* teaching values, what will the results be?

The robots have at least one other important side effect. The experimental children have, by design, extremely sheltered lives. They do not have to deal with such problems as finding food, surviving foul weather or predator attacks, or disease. Yet much of the evolution of human society has been a matter of evolving ways to deal with just such problems. How will the experimental children (or their descendants) fare if and when their technological welfare system is removed and they have to deal with them on their own, with no prior experience?

In the case of the doctor-bots, at least, Spider's time traveler stipulated

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that they would "see them into adulthood and then fall apart." So they have one generation to learn enough about natural medicine to keep things going. Is that enough? Maybe not—or maybe it's just right. With the bots gone, they'll probably find it hard enough to deal with disease and injury that they *will* feel real pressure to learn fast. That will give them some practice at learning to deal with real problems, unexpected loss, and so on.

If they can survive enough generations to do it. . . .

If there are enough of them, of course, there's a good chance that some of them will. But the first *n* generations, where *n* is unknown, may be rough. If *n* is big enough, the experiment may indeed yield highly meaningful results. But how big is big enough?

Anthropologist Chad Oliver wrote a memorable story about another variation on the orphan experiment in which the time scale *was* quite long and the guinea pigs didn't have it so soft at the beginning. In "Transfusion" (*Astounding*, June 1959, and highly recommended if you haven't read it), a starfaring species (I'll try not to spoil *too* much of it for you!) faced a big, pervasive, long-term problem. The survival of their species was at stake, threatened by a formidable, widespread enemy against which nothing they tried worked. Eventually it occurred to them, as to Spider, that all their ideas were necessarily influenced by their cultural biases and they needed a transfusion of truly fresh ideas—even if they had to wait tens of thousands of years for them.

So they found a vacant world, not yet known to the enemy, and dumped a bunch of unbiased people there to evolve a totally new culture. Instead of children with a robotic support system, they left adults, male and female, who had been stripped of most of their memories—and they left them *completely* on their own for 25,000 years.

That might actually work—though just what "working" means in this context might be full of surprises for the experimenters. And not many experimenters are in a position to wait 25,000 years for results. . . .

So . . . it's a fascinating hypothetical experiment, in whatever specific form it might take, and rich in potential for speculation. What, for instance, might life be like for some of the individuals in the early generations of "guinea pigs"? We can guess, of course, as Spider and Chad and I have done above—but such guesses will remain only that unless and until the experiment is actually done.

Not that I'm actually *suggesting* that, you understand! ■

Life begets life. Energy creates energy. It is by spending oneself that one becomes rich.

—Sarah Bernhardt

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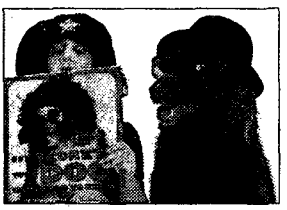

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SAM BOONE'S DRY RUN

Sam had always thought of himself as an arbitrator, but this trip forced him into two dramatically new roles. . . .

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PUBLIC DOMAIN

Sam's problems began as he was heading toward Bingnagia, a planet where, his agent Ahbbbb had said, with surprising faith in him, there was a simple problem that he could solve in a matter of moments—a trivial matter that required only the simple laying on of Sam Boone's very human hands, to put it simply. So convinced was she of his ability to bring the matter to a close that she had booked passage for him on a Blattskitt liner that was to depart just a week after his arrival on Bingnagia. "Shouldn't take you more than a few days to clean everything up," she'd said with confidence.

She'd gotten a cabin on a Glimmora freighter for him. "These are first-class accommodations," she'd hummed reassuringly, as her tendrils beat a rhythmic tattoo on the inflated bladder at her throat. "You will not be disappointed. They are so excited about transporting a human that they've added a wide selection of Earth delicacies."

These assurances of a gourmet feast and luxurious accommodations were uppermost in Sam's mind when he threw open the door to his cabin and saw what appeared to be an alien approximation of a musk ox staring at him.

It was a good imitation, lacking only the ox's delicate beauty of line and grace. Where a musk ox's horns would be, six rope-like tendrils erupted. Every one of these was in constant motion, a swirling mass of six snake-like appendages. The pseudo-ox was using the sharp tip of one of these to scratch its neck, just below its mane of thick hair.

Sam found the creature's stare to be very intense. The intensity was understandable, since the blue-haired alien had four complex eyes on each side and each one was independently focused on Sam's personage. It made him extremely uncomfortable to be the center of so much attention.

"Greetings," Sam said with as much bonhomie as possible and waited for his faithful portable translator, a marvel of Rix engineering, to convey his opening expression of friendliness to his unexpected traveling companion.

Snorf! the alien belched loudly as it swiveled three of its eight eyes to glance around the room while keeping Sam fixed with the other five. One of the snaking tendrils started to extend in Sam's direction and then diverted to scratch the corner of the ox's puce lips, just above its long, green beard. *Snorf*, the near-ox belched, repeating its earlier entreaty.

Sam reacted quickly as the expanding wave-front of the alien's breath reached his nostrils. A single whiff of the stomach-churning combination of halitosis and swamp gas was all it took to make Sam beat a rapid retreat. *Snorf!* the alien repeated as its lower jaw moved slowly from side to side and all eight eyes lazily returned to fix on Sam.

For some inexplicable reason the translator remained silent, giving Sam no indication of whatever it was that the alien had *Snorf*ed at him. Sam worried that perhaps the *Snorf*-eze language wasn't within the translator's data banks, which, he thought, would be a fine kettle of fish: How could he share a cabin for the weeks

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it would take to reach Bingnagia if he couldn't even converse with his traveling companion?

"There seems to be some sort of problem," Sam said, pressing his lips close to the microphone grille of his silver box so there would be no mistaking his desire to communicate. The translator's speaker remained mute, unwilling or unable to produce a single, decent *Snorf*. Sam was infuriated with the stubbornness of the little machine. "Damn it!" He slapped the translator's case with his hand—hard. He got nothing but a stinging palm for the effort.

The machine still refused to produce a decent *Snorf*.

While this was taking place, the ox-thing appeared to have lost interest in things Samuel and stuck its head into the opening of a large sack hanging from a hook on the wall of the cabin. Two of the alien's tendrils stretched the bag's opening wide enough to allow entry of the exobiotic-ox's huge snout. Loud chewing and smacking sounds came from within as the ox's head moved back and forth.

Sam considered the situation. The Rix translator had never, not once, failed him before. In every situation the machine seemed to adapt itself well to the speech mode of every intelligent alien he'd encountered.

"What if," he said aloud, "this alien *isn't* intelligent? What if it has no language?" But that would be ridiculous. Why would anyone pay cabin-class simply to transport some galactic livestock? The fee for cabin-class interstellar transport was far too expensive to make that a possibility.

Then another thought, a more frightening one, dawned. What if this ox-thing was his as-yet-unmet cabinmate's pet? The idea that he would be sharing his room with something that would make this creature a *pet* was daunting. Still, it was a possibility: he'd not had that much experience with the galactics to understand some of the subtleties of their various cultures.

Sam's train of conjecture was interrupted by a hissing noise that quickly built into a roaring crescendo. With dismay Sam realized that the sound was coming from the ox's nether regions, just below the tangled ropes of its two tails. As the sound died away the cabin quickly acquired an overpowering aroma. Sam's nose shut down at the first hint of the odoriferous gas. Acting quickly, his brain frantically instructed his lungs to stop breathing, lest he inhale more of the noxious fumes. Staggering backward, Sam fumbled for the door latch, and desperately flipped it so he could escape into the passageway.

As the door slid shut behind him, he took a deep breath of relatively fresh air to clear his nasal passages of the stench. As soon as he had his respiration under control he reflected on the situation. There was no way he could tolerate sharing a cabin with a creature that was more offensive than a campsite full of bean-fed Boy Scouts. And, unlike the aforementioned scouts, he couldn't even talk to it! No, the situation would have to be reconciled. He went forward to complain.

After considerable searching through the organically convoluted passageways of the Glimmora

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freighter, which led him in turn to stockpiles of sticky tape, condoms, and sunglasses for the galactic trade, he managed to reach the command compartment, the nerve center of the freighter's operations. A seemingly haphazard arrangement of dials imprinted with Glax figures, glass gauges filled with some thick liquid, and glistening readouts in a riot of colors dotted the walls. In the center of the forward panel was a phloomb generator, no doubt the heart of the ship's operation. It was the typical bridge of an interstellar ship.

The only problem was, there was no crew in sight.

"Welcome to Glimmora Freight Lines Glizma-class service," an annunciator annunciated in dulcet tones, albeit at about ninety decibels or more. Sam's somewhat trusty translator converted the ear-shattering din into reasonably understandable Glax. "This ship is equipped with the latest designs to provide safe, efficient, and faultless transport."

"Er, where are the captain and crew?" Sam asked hesitantly, wondering just where the voice was coming from.

"Welcome to Glimmora Freight Lines Glizma-class service," the din replied. "This ship is equipped with the latest designs to provide safe, efficient, and faultless transport."

Sam hesitated before saying anything else. A small voice inside was telling him something that he didn't want to hear. "Ah, is this ship automated?" he asked.

"Welcome to Glimmora Freight Lines Glizma-class service," the ship responded. "This ship is equipped with the latest designs to provide safe, efficient, and faultless transport."

After careful examination of the compartment Sam discovered a solid chunk of Glimmora machinery encased in a transparent block located just beneath the phloomb generator. The accompanying explanation plaque revealed, according to his somewhat dubious rendering of the Glax script chiseled into its surface, that this was an innovation that would make freight shipments more dependable and economical. Sam thought the latter was probably the key phrase so far as Glimmora Freight Lines was concerned.

Sam searched the cube and the surrounding walls for some sort of input device, but there was no provision for this on the freighter. Apparently, input was not something any of the cargo, nee passengers, usually needed.

Shu, shu, shu. Sam turned to see what had caused the rustling noise behind him. As he did so the translator rang out. "I say, old boy, aren't you the, um, human chappie?"

Sam stared down at the strangest alien he had seen in all of his travels. The thing was all scales and chitin, with random hairs sticking out of each joint of its thick eight legs. A huge pair of articulated antennae projected from the shiny black helmet of a head and four tiny, beady black eyes stared at him from their base. A set of vicious-looking mandibles extended from the bottom of the creature's head. The alien was so short that its head was level with Sam's waist.

Shuuushu, shu, shu, shusssu—"Al-

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TECHNOLOGY UPDATE

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low me to introduce myself, human thing." Sam noted that the noise came from the rasping of the creature's mandibles as it rubbed them together. "Right honorable Dratte Five Decline, FSF, ASFSF, IASFM, Admiral of the Fleet, Royal Tsith Companion, and Protector of the Queen's Rump. And, by virtue of temperament, a traveler without peer."

Disconcertingly, each of Dratte's feet was encased in a pair of thick-soled, bright orange, Earth-style, high-top sneakers. A black cap with a pair of round ears sat at a jaunty angle between the creature's antennae, held in place by a thin elastic string. Quite obviously, the Tsith had recently visited Earth. As the translator repeated the creature's rasping speech the heels of all eight pairs of its rubber heels slapped together, making a muffled thump.

"Sam Boone, itinerant negotiator," Sam replied and almost saluted. Instead he bowed to his short companion.

"Yes, yes. I know," Dratte Five said. "Saw your name on the manifest. Anxious to make your acquaintance, y'see. Blasted trip to Earth was too short. Didn't have a chance to meet you aborigines, er, natives." Dratte Five shuffled his feet as if embarrassed by his gaffe. "Whatever you call yourselves," he rasped lamely.

"Well, I'm glad to meet you as well," Sam replied diplomatically and let his translator provide an equally rasping reply. "Do you travel Glimmora much?"

"Quite. Good service. Fine accommodations. Excellent cellar. Why do you ask?"

Sam wondered if he should involve this friendly creature, so unlike most of the standoffish galactics he'd encountered so far, in his small problem. On the other hand, he had no other choice but to do so if he was to resolve this problem with the hairy gas generator in his cabin. "How does one go about complaining to the captain on this ship? I can't seem to find an input device."

"Isn't one. Best part of Glimmora technology. Everything set up perfectly. No chance of error."

"Well, there does seem to be an error in booking," Sam replied. "My cabin accommodations are, shall we say, less than perfect." Quickly he went on to describe the situation that he faced to the sympathetic Tsith.

Dratte Five rocked up on his back four legs. *Shuuuuu,* "That is a problem. But I may be able to help. Ever willing to help a fellow traveler, y'know. Let's discuss it at the bar."

Dratte Five put an appendage about Sam's waist and waddled from side to side as it led Sam away. Apparently the Tsith could not bend its legs and move using its six legs as two sets of alternating tripods. "Perhaps you can stand me a few drinks of glycol, straight up, as we talk. The Glimmora are all dull, stodgy herbivores, but they distill a mean whiskey."

The next morning Sam discovered quite an assortment of galactics as he entered the common room, all of them eating, lapping, absorbing, and otherwise ingesting their various cuisines with great gusto. From the enthusiasm most displayed as they at-

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tacked their food the auto-chef must have outdone itself. Sam's mouth began to water as he anticipated the delights to come. Hadn't Ahbbbb said that they'd loaded the recipes for all sorts of Earth goodies? After his experience with the cabin something had to go right. One out of two wouldn't be bad.

The auto-chef recognized Sam and began to grind and rock vigorously as it prepared what he hoped would be a gourmand's delight. He was hungry enough to eat a horse.

"Voila!" the auto-chef announced at last and burped a small plate on which resided a soft, pale-yellow pellet, slightly smaller than Sam's fist. Beside the strange pellet was a cup of gray, steaming liquid.

"Spaetzle und miso," the auto-chef announced proudly. "Earth food."

"Is this the first course?" Sam asked as he pushed the yellow pellet around the plate. "I need something more substantial than this," he told the machine. "I can't live on just this little pill. It's barely a mouthful."

"Your meal has been carefully formulated and balanced to supply you with all of a human's necessary daily nutritional requirements," the auto-chef shot back.

Sam wondered if the rest of the passengers were being slowly starved by the auto-chef's meager rations; could that be why they were consuming their portions with such gusto?

"I don't care about nutrition, damn it. I need real food. I need meat—a nice chop, a bit of steak, some sausage!"

The auto-chef hesitated. "Are you stating that you are a carnivore? That you consume the flesh of living creatures?"

"Yes!" Sam all but shouted.

The loudspeaker came on over Sam's head. A din of several Glax languages emerged, each one to its own frequency band. "Attention all passengers," his machine translated. "There is a predatory carnivore in the ship. All passengers are warned to be careful. Glimmora Freight Handlers accepts no liability for the actions of this animal!"

Before the last syllable of the announcement died away all of the aliens had run, hopped, or flown from the common room. Sam held his ears against the cacophony of sound that must have been their screams of panic. Which reminded him, he thought as he panicked, he was a long way from his cabin. Lord, what if the killer was his cabin mate? What if . . . a sudden suspicion entered Sam's fearful thoughts.

"By any chance was that announcement about me?" he asked with growing apprehension.

"I must protect the passengers," the auto-chef responded primly. "I cannot allow them to become entrees to your hideous appetite."

Sam went to a table where he sipped his fish soup and chewed the yellow pellet. The soup had become cold, which reduced the fishy aroma somewhat, so he was able to get it down without a problem. The pellet, however, was so tasteless and salty that he began to wonder what broiled auto-chef might taste like.

Snorf, huffed Sam's companion as he returned to the cabin. Dratte Five

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had thus far been unable to come up with a way to communicate Sam's predicament to the ship and so arrange for another accommodation.

"*Snorf* yourself," Sam replied with a cautious intake of breath. The cabin air was somewhat breathable, lacking the eau-de-ox that had so permeated the atmosphere when he had departed. He again wondered why he had been paired with this rough, fetid beast. Then another consideration came to him. What if an entire ecology of pests were hiding in that thick mat of creature's coarse blue hair? Could they pose a hidden danger? To see if his concern was valid, he leaned closer to examine the ox's hide, uncaring of what the alien ox might think.

"Hello there!" his translator burst out. Sam leaped back. He hadn't heard a single *Snorf* from the ox. Why had the translator chosen to work at this time?

"Hello yourself," he replied, but the translator remained silent. Puzzled, Sam moved closer to the ox. He repeated the greeting with no result. He stepped closer until he was at the exact position where he had heard the first greeting.

"Don't move away!" blared the translator. "We're having a hell of a time boosting the volume to a level you can hear."

"Uh, where are you?" Sam wondered, looking around. Ghosts?

"Down here! Lean closer so we don't have to shout."

Sam glanced down and noticed that his translator dangled into the mass of hair on the ox's back. Just beneath the box, among the ox's thick hairs, were a few tiny, black specks that looked suspiciously like fleas. He could barely make out a shining dot in the midst of them—their booster, perhaps?

"Put the box down near us," the translator blared again.

Sam did so, trying to avoid crushing any of the specks accidentally. "You, you live *on* this animal?" he asked in amazement.

"Of course we do. How else can a race our size survive?" the specks replied.

Sam pondered on why he had never before considered the question of scale among the various races in the Hegemony. Most of the galactics he'd met to date were more or less human-sized, provided that you accepted a 200 percent variance as "human-sized," of course. Still, given the breadth and scope of galactic civilization, almost anything might be possible. Why not intelligent fleas?

Sam leaned over the ox's back, trying not to get a snootful of the creature's overpowering aroma as he did so. "I say," he shouted into the thick hair. "I'm pleased to make your acquaintance."

"Greetings, yourself, whatever you are. Sorry to take so long to get back to you but we've had to run quite a ways from the campsite to get within range."

"Campsite?" Sam replied, hoping that the translator would convey his confusion at the term the flea had used.

"Oh yes, most of this region is set aside as a truzdl wilderness area. Great for the kids. We usually live in Great Neck, Mane—prime real estate,

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you know. Anyhow, it's nice to occasionally get away with the kids and commune with raw nature, as it were."

Kids? Sam tried to imagine little uniformed truzdl flea-scouts setting up tents, building campfires, and telling scary stories as darkness fell. He wondered if they earned tiny merit badges as well.

"I am a human," Sam explained with his mouth as close to the translator as the stench of the ox would allow. As he did so he could just make out the very faint, high-pitched chirping noises, almost at the limits of his hearing, that must be the truzdl's language. "From Earth," he added, just in case they had never heard of humans.

"Fascinating," the box translated. "We have, of course, heard of your planet and are anxious to go there some day. Do you have any recommendations as to which sights would be worth a visit?"

For a second Sam contemplated recommending the primary sites that seemed to fascinate most of the galactic tourists—Disneyland, Hoboken, and Kawasaki's Rib 'n Sushi Bar. But then he reconsidered, unsure of whether Disneyland would have rides small enough to accommodate these flea-sized creatures, uncertain of how they would deal with Kawasaki's fare, and afraid that the tiny truzdls might get mugged in Hoboken by the local insect population, none of whom were signatories to the Galactic Accords.

"Perhaps you'd like to visit a cattle ranch," he suggested, and described how Earth's vast ranges were dotted with thousands and thousands of bison, steers, sheep, llamas, and yaks.

"It sounds like heaven," the truzdls replied. "Yes, when we get back from our mission we will spread the word. I imagine that many of our race will want to colonize such an exotic and sparsely populated world."

Upon hearing those words Sam immediately regretted his suggestion. The last thing Earth needed was an increase in the vermin population, being already overrun with flies, mosquitoes, ticks, no-see-ums, and lawyers. Still, a population of intelligent fleas might make life more interesting for the less fortunate, being able to converse with their vermin. It might even enliven some midwestern communities, there being little else to do in many of the smaller towns.

Sam spent the rest of the evening making friendly conversation, interrupted only by the occasional shifts of the truzdl's host and Sam's frequent dashes for fresh air as the sham-ox continued to process its feed. The truzdls were good company, pleasant conversationalists, and, to hear them tell it, very well traveled.

"We do have one tiny request," Bunion, the principal speaker, asked matter-of-factly. "We would appreciate it if you didn't mention our presence to anyone."

"Are you stowaways?" Sam asked with a smile.

"A single ticket is a lot cheaper for us, you see. As you know, the Glimmoras assess a head count for passengers and we couldn't afford that," Bunion replied.

Matter of fact, Sam hadn't known that. Hmmm, maybe the lower fare

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was why Ahbbbb had arranged for him to share this cabin; she was never one to miss on the opportunity to shave expenses, usually at his expense.

"Have you ever considered getting group rates?" Sam asked.

Snorf ate his feed throughout the night, pausing not an instant to relieve itself of mounds of processed feed that the floor magically absorbed with a soft, slurping sound. Sam half expected each ingestion to be followed by an "Ahhhh," but that never occurred. The mock-ox belched irregularly, when it wasn't breaking wind, and, between the two, suffused the cabin with such pungent presence that sleep, punctuated by frequent dashes to the passageway for fresh air, was impossible.

What if, Sam worried in the dark soul of the night, there should be a spark from some device? Would it ignite the methane-rich atmosphere of the cabin and destroy the ship, killing him, the ox, and the population of truzdls that inhabited it? There was another blast of wind that took his breath away.

He wondered if there was a lighter in his kit as he dashed for the door.

The auto-chef bleated the warning of the approaching carnivore to the passengers as Sam entered the common room for breakfast. By the time he arrived there wasn't a soul in sight.

When Sam stated his desires for breakfast, the crystalline auto-chef produced a greenish-yellow pellet and a tiny cup of thick, bitter broth for his breakfast. "Eggs and coffee," it announced. "Per spec." Sam wondered what alien race had programmed the machine and what Earth had done to make them hate humanity so much.

"I said that I wanted cereal," Sam protested. "I explicitly said cereal, with milk!"

"Humans eat eggs. Humans drink coffee," the auto-chef stubbornly argued.

"But I don't eat eggs or drink coffee," Sam screamed.

"Have I mistaken your species?" the auto-chef said incredulously as it blinked in confusion. "Please state your race."

"I am Sam Boone, Earth human," Sam said obediently. "And I want my damned cereal!"

"Sam Boone is human creature. Humans eat eggs and drink coffee. What is wrong with this logic?"

"It's the premise, not the logic," Sam muttered murderously. "And if you don't produce something edible I will personally reach inside there and rip out your stupid, arrogant guts!"

"You have declared yourself as a predator and therefore a possibly violent and abusive being. The crew of an interstellar ship in flight is authorized to defend itself to the death against such beings."

"But you aren't really crew; you're just a stupid machine! I—" Sam stopped. While he doubted that the auto-chef would carry out its threats, he didn't really know the capabilities of this ship and, where galactics were concerned, caution was ever the watchword.

He carried his greenish-yellow pel-

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let and cup of possibly lethal coffee to a table.

"Here's how I can help you, old boy," Dratte Five *shu-shu*-ed when he spotted Sam staring at the nutritious and healthy breakfast pellet in front of him. Dratte pulled itself into a restful position across the table. "Have a luxury cabin, y'know. Place is quite large. Willing to share, y'see. Welcome the company. Er, you won't eat me, will you?"

"That," Sam said with a nod at the auto-chef, which was probably keeping a wary LED on him lest he attack, "was a misunderstanding between me and that stupid machine. The only nasty habit that I have is that I snore." When Dratte Five rubbed its antennae nervously at the strange concept, he quickly added, "Don't worry, that just means that I make loud noises while I sleep."

"Good. Nothing to worry about," Dratte Five said with obvious relief and slapped Sam's shoulder. "Don't sleep myself. Nasty habit. Better ways for we Tsith. But glad to help. Consider it done. Now, d'you think the bar's open?"

Dratte Five's cabin turned out to be much, much larger than Sam's. For the hundredth time he wondered at the lengths his agent would go to save a fraction of a glizzatina if the opportunity presented itself. Lord knows, with what she was charging their clients for Sam's negotiating services, she could arrange better accommodations than those he'd been forced to endure thus far.

To his surprise there was even a human-sized bed—a soft, billowy bed—in the Tsith's cabin. With pillows even! For a second he worried that he might find himself sleeping side-by-side with Dratte Five and his multiple pairs of Keds. But, hadn't the friendly alien said that it didn't sleep? If that was so then why then did it need a cabin? Not that any of that mattered a whit, he realized with a smile, for that meant that he would have the entire bed to himself! He could not believe his luck in finding so charitable an alien as Dratte.

He moved his kit into the cabin within the hour.

Lunch was a brownish pellet (falafel, the auto-chef said nastily) and a fizzy drink that tasted remotely like cola. Dinner was a feast; two (count them) pellets—one brown and the other beige. "Humus and pita," the auto-chef reported in reply to Sam's inquiry. "With yogurt." The small cup of thick liquid was nice and warm.

"Delicious," Sam said, hoping that by doing so he would prevent the machine from obtaining any pleasure from his reaction to the serving.

As was his custom of late, Sam returned to his former cabin to talk with the truzdls after dinner. It was the only way he could get away from the overly helpful and ever-present Dratte Five. There was such a thing as being too friendly.

Despite occasional prompting by Bunion-of-Hide, the spokesflea for the campers, that he talk to the city fathers up in the mane, Sam protested that he wanted to confine himself to the few truzdls he already knew. "I'd rather not deal with the government

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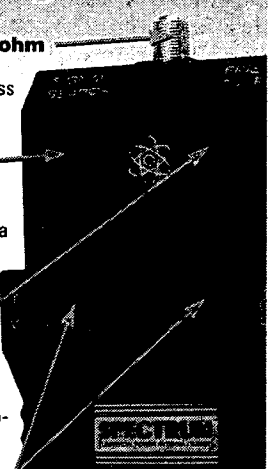

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types when I'm not working. Somehow I doubt that the bloodsuckers here would be any different from the others I've known." Almost immediately he regretted his choice of words.

"No offense taken," Bunion assured him. "I feel much the same."

The ancestors of the truzdls, Sam learned through his new friends, had constructed vast cities that towered over the plains of their native planet. Some of these reared nearly six meters into the heavens and contained millions of inhabitants. Sometime in the dim pre-phloomb, pre-civilized ages, an adventurous group had discovered the peripatetic pleasures that came with populating the blue ox-beasts that wandered their world. Since then an entire mobile truzdl culture had grown up. These groups wandered far and wide, never staying in one place for long. Using these animals they had spread their civilization throughout the world, and beyond.

"I imagine that was your first great age of ox-ploration," Sam observed. He could practically hear the little flea scouts laughing at his poor pun in the background. Bunion only growled.

As the truzdls described their journeys Sam wondered if the band of interstellar gypsies had developed their own songs and dances. He tried to imagine Bunion and the others playing their little flea fiddles and balalaikas late into the evening. He tired to picture how the flashy-clothed, dashing crowd would appear when glimpsed through a forest of blue ox-hairs, snapping their pincers as their multiple legs beat out a manic staccato to the fierce rhythms of the gypsy music.

And so to bed, for Bingnagia awaited.

Dratte Five seemed to have an unquenchable thirst for two things: the bar's various brands of glycol and Sam's business. Of secondary interest were all things having to do with Earth, such as why humanity hadn't done away with all that nasty water in Earth's atmosphere and why humans hadn't adopted phloomb technology earlier. "Your commitment to electromagnetism is so déclassé. Ridiculously wasteful," he said condescendingly. "Such deliberately profligate energy use make you appear to be rubes, backward and ignorant."

Sam tried to smile, despite the insult—which was also too painfully true.

When he wasn't probing, Dratte Five regaled Sam with tales of his own travels and adventures, some of which were quite beyond belief. Still, one could never be sure where the line between truth and fiction was: The galaxy was so vast, the worlds so diverse, that everything seemed possible to Sam's poor, unsophisticated mind.

As best Sam could make out, Dratte Five was some sort of exterminator, making his living by ridding various races of pests. "It must pay well," he remarked after hearing one amusing bit that might have involved either nuclear bombs or phloomb implosions if the translator was working correctly. The technology and its application to pest control were quite incomprehensible in either case.

"Pays quite well. Few of my clients

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complain," Dratte Five replied with a wiggle of its antennae. "And none of the victims," it added with a grinding rasp of its mandibles.

Sam was surprised by Dratte's remark. He hadn't realized that the Tsith had a compassionate core, much less feel pity for the pests he eliminated. He couldn't recall an Orkin man ever referring to cockroaches as "victims." Perhaps the Tsith operated on a higher moral plane. Earth could learn a lesson from him.

Dratte Five was quite interested in Sam's destination, and even more so when he discovered that Sam was to deal with their exalted leader, the M-Ditsch, itself.

"Few outsiders ever get close to the M-Ditsch," he'd explained. "Bingnagia's leader is highly suspicious. Very tight security. Comes to the government compound infrequently. To be expected. Backstabbers, y'know."

"Backstabbers?" Sam said. "Why should they want to harm their leader?"

Dratte Five leaned close so that his rasps were barely above a faint scratching sound. "Assassin culture, y'know. Every hand against the leader, y'see. Ditsch can't protect his own back, not much good. Blasted underlings always looking for a chance to better themselves. Nasty fellows, them."

Suddenly, Sam did not feel confident that this assignment was going to be as simple as Ahbbbb had stated. He would be in the line of fire, so to speak, in a culture that espoused regicide or worse.

"Wish you well. Hope you get through quickly," Dratte Five went on. "Court's going to get involved. Rumors abound. In and out fast. That's my advice."

Sam froze when he heard this. The last thing he wanted anything to do with was the Galactic Hegemony's court system. From the tales he'd heard, the Court's judgments were rather draconian; that is, if you could ever get your case on the docket, and provided that you could survive the preliminary visit of the Clerk of Court. Every galactic he had spoken to had expressed a decided aversion to court disputes; it was a sure way of both sides losing everything they had.

"Perhaps that is why the Bingnagians wanted a human negotiator," Sam said hopefully. "To keep the Court out of it."

"Quite possibly," rasped Dratte Five as he sucked another tumbler of glycol, his fifth in the past hour, through the base of his eating foot. In the past few days his imbibing had increased markedly. Dratte twiddled his antennae as if thinking deeply about what he was going to say as he drained the last of the Glimmora whiskey. "I really like you, Sam," he rasped quietly as he waited for the auto-chef to refill the cup.

"Well, I like you, too," Sam answered cautiously, wondering where this startling revelation of affection was going. "I just wish that I could do something for you to show my appreciation for all you've done."

Dratte Five rubbed his appendages together. "Owe me nothing. Glad to help. Like to give *you* something. A me-

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mento of the time we've spent. Small thing." Dratte spread his antennae to indicate something about the size of a basketball. "Something you'll like, I'm sure. Mark of my esteem, as it were."

Sam nodded. "I'm flattered, but you really don't need to—"

"Not another word. Be my pleasure. Can't do it now, though. Have to, uh, get it out of storage. But, have no fear, I'll get it to you before you leave. Now," he said with a gracious wave of his antennae, "I'll stand you another round. Beer still your choice of beverage?"

Sam nodded numbly. The auto-chef seemed to continue to display its hatred of humanity in general, and Sam in particular, by serving a variety of poisons that threatened to destroy Sam's carefully nurtured health. The beer, as one sterling example, suffered no degradation of quality as it passed through his system. He even wondered if the auto-chef simply recycled the used beer from his cabin and rebottled it for his next round. It was hard to tell from the taste.

Still, it was better than the wine.

Sam was immersed in a sea of blondes, surfing over heaving bosoms, plunging into the sargasso of sweet smelling arms and legs, and tangling his hands in the seaweed of long blonde tresses. He swam blissfully abreast in the sensuously warm sea, listening to the distant squealing of the foghorn.

He awakened with a start. That was no fog horn; it was the ship's alarm! They must be docking at the Bingnagia spaceport.

As he jumped from the bed he noticed that the air was uncomfortably humid, as if someone had sprayed the cabin with a fire hose. He checked the environmental settings and was surprised to see that Dratte had set the dehumidifier on high. Why, then, was the room so damp?

As he walked back to the bed his foot struck an object in the center of the floor. The impact sent a stab of agony racing up his leg. Sam hobbled to the side of the bed, clutching his foot in his hand, his big toe throbbing in pain. After the agony of his injury receded, Sam limped over to examine whatever had given him so much pain. He was certain that the object had not been there the previous evening.

It turned out to be a nondescript, brownish-gray lump, somewhat angular, with overlapping planes surrounding it. It was about the size of a basketball.

Sam hefted the object and was surprised at how much it weighed. He placed it on the bed and sat beside it, wondering why Dratte had left the thing sitting in the middle of the floor, surrounded by a damp ring that was fast disappearing into the absorbent floor. The unattractive object was no doubt the gift Dratte wanted Sam to deliver.

Dratte? Now that he thought of it, where was his cabin mate? His four pairs of orange tennis shoes sat lined up neatly to one side of the cabin, and the mouselike little black hat was still on a hanger. Surely he wouldn't have gone far in dishevel, would he? He decided to search for him.

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He couldn't find Dratte Five in the common room, in the bar, nor in any of his other, usual abodes. For all intents and purposes the Tsith appeared to have vanished without a trace. Sam decided to eat and wait for him to show up.

For his last breakfast, the auto-chef disgorged a bright-yellow pellet, which it swore was a human delicacy known as "Welsh rarebit." The lumpy white liquid in the accompanying cup was so disgusting in appearance that he refused to ask what it was. He swore that he would never again fly Glimmora, not ever. Never!

"Oh, by the way," he asked the auto-chef as he turned to leave, "my friend, the Tsith, seems to have disappeared. Have you seen him this morning?"

"Dratte Five Decline was last seen entering his cabin last evening after drinking twelve glycol and gingers."

"But he's not in the cabin," Sam protested. "He is gone."

"He did not emerge from the cabin. Did you eat him?" the auto-chef asked flatly.

"Of course I did," Sam shot back, angry at the suggestion. Thanks to the auto-chef's predator announcement weeks ago, he'd had no one to talk to except the Tsith and the truzdls.

"The ship has docked," an announcement screeched from the overhead in several languages. "All departing passengers must leave. The ship will depart in one tiska-taska." Sam did a quick time conversion in his head and realized that he had only an hour to get everything together and say his good-byes. He hastened to the cabin to gather his few personal things; his kit, and that ugly lump of a gift. He then rushed to the truzdl's cabin to bid them farewell, hoping he would run into Dratte along the way, but was disappointed when he did not.

He'd spent so much time saying good-bye to his flea friends, and the ersatz-ox they rode in on, that he had to race for the dock while the departure horn blared. He squeezed through just as the hatch snapped shut at his heels, and ran into something solid and unyielding.

He rebounded from the set of four tree trunks he had impacted. As he looked up he discovered that these were incongruously wrapped in purple shorts. He continued to look up. And up.

Two meters above his eyes was a bullet-shaped head containing a pair of huge ears, neatly bisected by a flaccid, drooping tube. Two small, beady eyes peered from beneath a huge overshadowing ridge of flesh atop of what he suspected was the alien's skull. Beneath its head was a solid block of four-armed muscle that rested on the four tree trunks which, Sam now realized, must be the Bingnagian's legs. This monster must be, he concluded, the welcoming committee.

The Bingnagian reached out with one of its foreclaws and snatched Sam's kit from his hand. *Nhff,* it hooted through its tube. "Follow me," the translator croaked. The Bingnagian led the way to a shuttle port and, with a casual wave of its aft claw, indicated that Sam should climb aboard.

Sam did so and climbed, with considerable difficulty, onto one of the

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oversized seats on the Bingnagia shuttle. Moments later, as he was struggling to settle himself on the cylindrical, padded cushion, the pilot and Sam's escort flopped onto theirs and began throwing switches and pumping levers to build up pressure. The two seat belts on his "seat" were each as wide as Sam's chest, with buckles the size of his head. As he was forcing the ends of one belt and buckle together the Bingnagia pilot stuck his breathing tube over his shoulder without turning around.

Hnifff, zzlig tka! it hooted through that orifice. "We're leaving," the translator decoded just as the engines fired and threw Sam against the unyielding seat back. The trip to the surface of the planet was thankfully short.

Four more of the huge Bingnagians shuffled aboard as soon as the shuttle taxied to a stop. *Lfffg tka nfflgt!* the first one hooted loudly. "About time you got here!" the translator repeated. "Come along. We're not paying you to sit around enjoying the scenery." Sam obediently picked up his things and followed the escort as they led the way out of the shuttle.

The Bingnagia landing field's surroundings were of a scale with these aliens. Gargantuan buildings reared on all sides of the field. Huge vehicles roared with abandon across the tarmac, nearly running into each other. Groups of the gigantic aliens raced here and there. Some groups seemed to be engaged in such fierce fighting that Sam wondered if they had entered a combat zone. Was there a civil war raging? Was that the dispute he'd been sent to solve?

His escorts suddenly diverted from the marked path to rudely bump some equipment handlers aside as they left the shuttle's ramp. The handlers bumped back and, in a matter of seconds, the two groups were brawling, smashing their huge claws against each other, kicking with their muscled legs and immense feet. Sam ducked around the mass of battling giants and ran for the nearest building.

Before he could reach it, the door swung open and a Bingnagian that was even larger than the others rushed out. *Gnfft Tka,* it hooted at the frightened Sam—"Move aside!"—and raced to the fray, its massive legs pumping furiously.

Sam watched in disbelief as this new arrival began to indiscriminately beat up on whichever Bingnagia came to the top of the pile, its four claws striking out in every direction until there were no more combatants standing. The late arrival then proceeded to pull Sam's escorts to their feet and smash each of them another time with its main claw, a bruising blow that looked as if it would probably kill a horse . . . or slow an opposing lineman, Sam suddenly thought, wondering what the NFL would do to have a couple of these aliens on their teams.

The huge alien and Sam's much-battered escorts rejoined Sam inside the terminal. "Sorry for the inconvenience, but we hadn't seen our friends for some time and needed to get reacquainted," one of them huffed through its battered and bruised tube.

"Is *that* what you consider a friendly greeting?" Sam asked incredulously.

The Bingnagians pulled themselves

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upright proudly. "Of course, how else can we tell where we stand with each other?"

Sam was glad the group hadn't run into their girlfriends. Probably none of them would have survived the celebration. He followed as they led the way to ground transport, hoping they ran into no more acquaintances on the way.

The security at the Bingnagian government compound was quite impressive. Sam had to go through sixteen security checks, each staffed by a dozen or more heavily armed Bingnagians who ferociously scanned both his body and kit for hidden weapons. Sam had to show his credentials at each guard post and then wait as his escorts smashed one or more of the guardsmen in the now customary round of friendly fellow-bashing.

The inner court was also heavily guarded. There was a platoon or more of soldiers parading endlessly back and forth under the shouted orders of what Sam assumed were officers, since they were the ones who were *not* marching to and fro.

His terminal escorts, a pair of Bingnagians dressed in neon trunks, produced a ring of keys, each one the size of Sam's arm. With great ceremony the guards unlocked the half-dozen locks in the door to the compound's inner keep. Finally, when the last tumbler fell, the door swung wide. They motioned for Sam to step into the dimly lit interior.

Sam did so and found himself in a broad hallway. The door slammed behind him. He could hear the guards clicking the many locks closed. He assumed there would be no going back without an escort.

Sam picked up his things and began to walk down the hall. On either side were large depictions of various Bingnagians. A common theme seemed to run through them all. In each were a surprising array of dead animals, or other alien races—it was so hard to tell when traveling through the galaxy—around an erect Bingnagian principal. One particularly garish portrait, prominently displayed at the far end of the hall and dominating the rest, showed a golden-trunked Bingnagian standing astride several obviously dead Bingnagians, each one with a dagger prominently displayed in the center of its back. The paint glistened as if it were still wet.

"That must be the M-Ditsch," Sam remarked aloud and wondered at the bloodthirsty monsters Ahbbbb had sent him to help.

Kmmmhffg—"It certainly is"—someone suddenly hooted behind him. Sam spun around and confronted an imposing monster, by far the largest Bingnagian he'd encountered so far, towering over him.

Hnffg tka ghjjjt—"You the human thing I asked for?"—it hooted in a surprisingly pleasant baritone.

"Sam Boone," Sam said and started to step forward, toward the giant, when his foot tangled in the cords of his kit and he flew forward. He grabbed at the alien's legs to hold himself up and, in doing so, thrust his head into the several crotches of the monster.

The huge alien leaped in surprise

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and slapped Sam away with one of its gigantic claws. "By the Gods, you are a polite one," it hooted as Sam ricocheted off the wall. "I hadn't expected that a human would know how to greet someone properly. Good to see that you have decent manners, even if they are somewhat sneaky." It carefully probed the impact area tenderly with its tiny rearmost claws. "By the way, I'm the head protector of the M-Ditsch, Bro B."

Sam's head was still ringing from the glancing slap. "Um, yes," he mumbled as he stumbled to his feet. "You certainly are." Damn, he'd have to be more careful in the future, he thought as he shook his head to clear it. He definitely wasn't going to hug anyone around here!

"Well, that's enough pleasantries. Come along," Bro B continued. "I've got to get those damned Adrinns to the table." Bro B turned and began striding away, forcing Sam to run alongside.

"Is the M-Ditsch going to be there?" Sam asked.

"The M-Ditsch only comes here once a week," Bro B replied. "He cannot expose himself to danger more frequently."

Sam recalled the pile of knifed corpses he'd seen beneath the regal heels of M-Ditsch in the painting and recalled Dratte's cautionary words. He could understand the M-Ditsch's reasons.

When they reached a room farther down the hall Bro B stopped and threw a door open. "This is your room. Rest up while I get the others together."

Sam dropped his kit in the middle of the room and looked around. The guest room was dripping with tapestries of untold beauty, cords of jewels, and strange gilded objects whose purpose he could not begin to guess. It was the most tacky display of wealth he'd seen since he left Reno.

In the center of the room was a wide, shallow pool, just the right depth for one of the Bingnagians to soak in. To one side sat a utilitarian bed. Six sturdy legs held a set of thick, bare planks a meter and a half off the floor, level with his chest. An ornately chiseled and embossed side chair was to scale with the bed. Sam felt as if he were four years old once again; a child in an adult's house. No sooner had that memory come to mind than he had a frightening thought and began to search for the bathroom.

By the time Sam had figured out how to use a toilet designed for a four-legged giant without being drowned, Bro B had returned.

"Everybody's ready. Let's go," he hooted, snapping the jaws of his main claw open and shut.

Sam went, dripping the whole way.

"All right, the human is here. Let's begin," Bro B hooted as he flopped into his chair. The room shook slightly, as if a small earth—er, bingnagia-quake, Sam corrected himself—had taken place. Four other Bingnagians were already seated. They were, Sam learned, Bro K, Bro T, Bro C, and another Bro T.

"Let's begin," one of the T-Bro's huffed angrily, with a nasty glance at the diminutive human.

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In the center of the table was a squeaking, puffing machine. On the one side, and pointed at the Bingnagians, were an arrangement of transparent tubes, one for each of the seated Bros. On the opposite side a set of thin threads ran across the table from the machine.

A cluster of tiny, cockroach-like aliens were standing very close together on a high stool where the threads ended in a set of tiny microphones. There were five of the aliens, although it was hard to count, since the four or five or six of them were in constant motion. During a lull, while the smallest one licked the feet of the others, Sam could actually count them. There were five, he was sure. Each was clothed in shining black leathers and had feathery antennae poking through its helmet. On second thought, perhaps those weren't leathers but their integument.

"Had to wait, had to wait," the translator barked as one of the largest Adrinns squealed into its thread.

"Ugly primitive," another squeaked as the huge machine on the table hooted and Sam's trusty silver box translated its words into Glax.

"Won't pay for this! Won't pay for it! We. Are. Not. Going. To. Pay!" three of the middle-sized ones chanted emphatically. Another of the aliens began to examine the pedal extremities of its companions.

The other little Adrinn heads nodded in unison with each emphatic bark. Sam was dismayed that the tiny aliens would choose to take such an aggressive opening position.

Bro B slammed his fist down on the table. It sounded like an explosion. "No way, Number One! We said we were going to ask the human to help and you said it was OK. You owe us your share, fair and square!" Bro B and Bro K shifted nervously at their chair-Bingnagian's outburst.

"We didn't agree to using it," Number One squeaked in protest, "we're not going to pay." The smallest Adrinn started to examine the feet of his larger companions. Sam wondered what the fascination might be. Were all of these creatures pedophiles?

Number One's words clearly had an immediate effect on the seated Bingnagians. They pushed their translator tubes to the side, put their heads together, and huffed quietly for a long time. Bro B, with much claw-clicking and tossing of his ears, finally emerged from the huddle.

"All right, we'll pay," he hooted, grudgingly.

"Got you, got you!" One barked.

"Don't have to be damn proud of it," Bro T said angrily. "You won't always get your way!"

"Will too, will too," another Adrinn squeaked.

Sam couldn't believe his ears. The Bingnagians, with the exception of Bro, were practically frothing at the trunk at the tiny alien's taunts, but did nothing. Clearly, any of them could squish the entire Adrinn contingent with one well-placed stomp. What was it about their little opponents that held them back? Would the Adrinns bite the Bingnagians, nibble their shorts, build nests in their hair, that is, if they'd had hair?

"I think it is time that I stepped into

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this," Sam announced as he calmly walked over to the table and laid his translator next to the huffing machine. "But, before we go any further I would like to talk with both parties in this dispute. Is that agreeable?"

"Waste of time!" Bro roared. "They won't talk!"

"Will too, will too," Number Four squeaked. "Show you!"

"Won't do any good," Bro B hooted. "They can't keep a promise. Won't stick by their own words."

"Do too," another of the Adrinns barked sharply. "But only with the M-Ditsch. We'll talk to the—"

"Enough!!" Sam shouted and slammed his fist down on the table. The two translators jumped and vibrated as they honked and chirped away. "We are going to have no resolution of this problem if all you can do is insult one another. Now, let's all try to be reasonable."

Bro jumped to his feet. "We have been reasonable, damn it! Let me tell you about—"

Sam quieted him with a fierce glare and a raised hand. "I meant that I should talk to each side *in private,*" he shouted.

"Oh."

As best he could decipher the situation, the Bingnagians claimed a bit of real estate, a planet in a nearby system. The planet was, they told him, absolute heaven; great shallow lakes, fine wallows of mud, flat plains that stretched as far as the eye could see. They were preparing to settle it when another set of galactics, known as the Gormlies, had secretly slipped a few hundred thousand of their kind onto the surface. In no time, the plains had been dotted with their burrows on which a running Bingnagian could break a leg. Worst of all, the Gormlie engineers were considering diverting the streams that fed the mud wallows. They were ruining the plains!

What was worse, the Gormlies absolutely refused to remove themselves from the planets claimed by the Bingnagians, citing religious differences—they being of the burrowing persuasion and the Bingnagians of the stomping. The Adrinns, who had trade relations with both sides, selling Gormlie and Bingnagian raw materials throughout the sector, had volunteered to act as intermediaries.

When Sam discussed these accusations the Adrinns admitted that the Gormlies had done all of those things, and more. "But," they squeaked, "it is their way to honor the Gods of holy trespass. There is no joy in taking what someone does not own."

Even when Sam casually mentioned that the Court would possibly intervene, the Adrinns reported that the Gormlies still refused to take a single step in the direction of resolving the dispute. The day ended with nothing resolved, nothing settled, not an iota of progress.

As did the next. And the one that followed. It was if the Adrinns were deliberately going out of their way to avoid resolution of the problem.

On the other hand, in each session the Bingnagians seemed inclined to soften their demands. Sam suggested that they agree to holding onto the only thing that mattered to them—the

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central plains, untouched by civilization. The remainder of the planet's surface could be held solely by the Gormlies. He asked the Adrinns to offer the same compromise position to the Gormlies with confidence that the remote aliens would refuse. Yet the Adrinns reported that they did.

By the end of Day Four Sam was on the verge of using the phloomb-driven ansible to contact Ahbbbb and tell her that the situation was hopeless. The only thing that held him back was that he hated to admit defeat. That, and the enmity that he would earn in Ahbbbb's mind, who would no doubt retaliate by ensuring that he was assigned only to the most unappealing hell-holes in the galaxy. Not that they would be too much of a step down from those he had so far; still, it was the principle. He decided to try for one more day. Then he would make the call.

His ship was to depart in three days and he planned to be on it.

The Bingnagians finally agreed that they were willing to share space with the Gormlies, wanting only the plains areas. It seemed as if they had finally reached a basis for compromise, an equitable division of the planetary land.

There was just one complication, a small thing, hardly worth noting. The only Bingnagian whom the Gormlies trusted to sign the agreement was the M-Ditsch, not his underlings. To that end they would send their own leader to Bingnagia to ratify the deal. Otherwise they refused, according to the Adrinns, to discuss a schedule, provide a date certain, or even discuss a protocol to discuss the matter. The Gormlies were adamant. They had to meet with the M-Ditsch himself or there would be no agreement!

The M-Ditsch arrived early the day before the historic meeting in a flurry of ceremony that seemed to consist of much hooting and stomping as the coterie of Bros gathered to welcome their illustrious leader, each one holding a ceremonial dagger behind his back while the M-Ditsch crept in cautiously, never taking his eyes off of his staff—aka his possible successors—and keeping his back to the wall.

The M-Ditsch was an imposing figure, clad in shining armor and armed with an arsenal of weapons that turned him into a walking fortress. No sooner had the leader come into the hall than he dropped an enormous pile of documents on the floor. As some of the Bros rushed forward to grab pieces of this largess the M-Ditsch leaped back, letting no Bingnagian get behind him.

One of the more ingratiating members of the group, the ingratiating Bro T, offered the great M-Ditsch a round object that it held in its claw. It appeared to be one of the edible sweets that Bro T constantly consumed. There was a small nibble, hardly noticeable, taken out of one side. The M-Ditsch slapped it away so quickly that Sam wondered if poison was a possibility.

As soon as all the papers had been picked up, the M-Ditsch moved sideways and entered a room with a set of imposing locks on the obviously heavily fortified door. No sooner was he inside than he slammed the door shut.

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"We must work on these," Bro B said as he directed the other Bro boys to various rooms to handle the papers. "We've got to get this week's work out of the way before the signing ceremony."

"When can I meet with the M-Ditsch?" Sam asked.

"At the ceremony," Bro B said confidently. "The M-Ditsch is very anxious to get it over with."

The arrival of the Gormlie leader was somewhat less imposing. A Bingnagian guard and a small party of Adrinns were carrying a transparent tray that appeared to be filled with sand. Small black dots crawled through tunnels behind the glass.

"You mean that the Gormlies are ants!" Sam exclaimed. No wonder that they didn't want to share the plains with the stomping Bingnagians; one misstep and an entire city could be wiped out. He wondered how many more insectile races there were in the galaxy?

The Adrinns took the Gormlies into the room that had been prepared for them. From the brief glance he had, Sam saw that sand had been spread all over the floor and a blazing lamp bathed the room in a warm, golden glow.

"Tomorrow will be a historic day," Bro B said. "A day we will surrender our planet to these, these . . . pests!" There was no doubting the vituperation in his voice. Clearly, Bro B did not like the forced compromise the M-Ditsch was to sign.

Sam sat on the huge chair in his room and went over the long, three-part document that had been prepared for the ceremony. One section was written in standard Glax, a second in the thick Bingnagian script, and finally, one with the tiny, nearly microscopic lines that must be the Gormlies' writing. Sam thought that if he had a microscope he could examine that section; that is, if he also could read their language.

Deciphering the Glax portion was chore enough, since Glax had seventy-four cases, seventeen tenses, and depended on position to denote whether a word was a noun, adjective, adverb, verb, or tush, this last being rather a weak appellation or strong modifier of whatever preceded it.

There was a knock on the door. When he opened it the Adrinns were standing there, surrounded by their ever-present Bingnagian guards.

"Party, party," one of the Adrinns barked at Sam. "Celebrate, celebrate!" With those words the little creatures rushed into Sam's room. One of them ran the water in the pool and they all began splashing around. Despite the playful aspect of what they were doing, the Adrinns seemed not to be having much fun. Each of them was dutifully splashing water on the others, immersing itself and then shaking off, and barking. It was almost as if it were a well-rehearsed performance of aliens enjoying themselves.

One of them picked up Dratte's gift and began tossing it around as if it were a beach ball. Clearly it was just at the limits of what Sam thought they could handle.

"Our place, our place," one of them shouted and, in an instant they were all out of the pool and heading for the

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door. "Come, come," they yelled and pulled Sam along with them.

The guards plodded along behind. One of them shut Sam's door.

The party with the quicksilver Adrinns was rather surreal, Sam thought. For one thing the little rascals appeared able to consume great quantities of alcohol, pouring tumblerfuls through several and various holes along their carapaces with much giggling and laughter. Despite their suggestions to the contrary, Sam decided to use only one of his several orifices for ingesting the potent brew the aliens had brought. It had a faint taste of gasoline and spice, but left a rather pleasant afterglow. By the fifth or sixth tumblerful he could hardly taste the gasoline or the spice. By the seventh he couldn't taste, period.

There was a game, he recalled with some limited clarity, that involved guessing in which hand a stone was hidden. He tended to lose a lot because he had only two hands while his opponents had six. Or twelve, or whatever. The odds stopped mattering after a while.

It was with some effort that the helpful Adrinns assisted Sam back to his room where they dumped him on the bed and left with the Bingnagian guards, all of whom looked rather bored by the human's limited capacity. But then, none of them had imbibed the Adrinns' whiskey.

Sam dreamt that he was being pursued by a pack of tiny kittens through a putrid swamp whose air was so pungent that he could hardly breathe. Jumping from hummock to hummock, some of which were huge slugs, Sam managed to stay barely one leap ahead of the pursuing pussies, their slashing whips, and their flaming weapons. If only he could breath some fresh air he could escape them, he thought as he jumped sideways to avoid a large tree that strongly resembled Ahbbbb, and . . . found himself on the floor beside the plank bed. He was shaking his head to clear it of the residual nightmare when the door burst open and Bro B and an escort of guards stomped in.

Hnffg tka Ghfft? Bro B demanded without preamble. "By the Gods, why is it so damp in here?"

Bits of the nightmare still colored the edges of reality and Sam wondered how the Bros managed to get into his swamp. "Whazzat?" he responded with as much intelligence as he could gather. Something was hammering on his temples with sledgehammer blows. A fire raged in his belly and he felt as if someone had put shovelfuls of the Gormlies's sand behind his eyelids. "Huh?" he added to clarify his previous confusion at the question.

Bro B continued to hoot as he snatched Sam's translator and tossed it at him. "A terrible crime has been committed!" the translator roared. "Why did you do it?"

Sam tried to think of what he possibly could have done to give Bro B the impression that he would commit a crime. The only possibly underhanded thing he'd done was to take a small bit of cheese from the food closet the previous day. Surely that wasn't so terrible that he needed to be awakened in the middle of the night, or was it

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morning? He was afraid to open his eyes and see. Blindness might be a possibility. Could that cheese have been the M-Ditsch's midnight snack, a snack that he had mistakenly snatched? That must be it, he concluded.

"I'll give it back if it means that much," he mumbled and staggered to the large chair, which danced and bobbed as it tried to evade him. Finally, he cornered the beast, reached up, and pulled down the damp, napkin-wrapped snack. He offered it to Bro B.

The huge Bingnagian looked at the wrapped morsel with a dumbfounded expression in his blue eyes. "Is this a joke?"

"Ish the only thing I've took, taken," Sam said with complete honesty and spread the napkin wide to show that it was just a piece of cheese.

"What is this?" Bro B roared. "That's the key to the M-Ditsch's room! I'd recognize it anywhere!"

Sam stared in amazement at the bauble that sat in the center of the napkin. Somehow, through some alien alchemy, the bit of cheese had transformed itself into a golden key.

Before Sam could utter a word of protest, the guards pulled him off the floor and dragged him down the hall, opened a door, and tossed him inside. Sam heard the key turn in the lock behind him as they left.

He looked around at his jail cell, if that is what it was. As far as he could tell this room was identical to the one he had just left, save that the humidity was substantially less. Sam walked cautiously to the huge chair, climbed carefully aboard so as not to explode the swelling dome of his skull. Once seated he tried to reason out the improbable chain of events from a stolen bit of cheese to discovery of the golden key, despite the throbbing of his temples.

Could he have been so drunk that he mistook the key for a snack? No, he was quite certain that he'd been sober at the time. Besides, even drunk he would never have made such a mistake. How, then, did the key get into the napkin and, his stomach reminded him, where the hell was the cheese? He debated the question until he fell asleep and dreamed fitfully of elephants and ants.

The question was still on his mind when he awoke hours later with only a minor headache. Why had the key caused such a reaction by Bro B? Almost as if summoned by his thoughts, that worthy came through the door in a rush, as if someone had pushed him. The heavy door slammed shut behind him.

"About time you explained what is going on around here," Sam said indignantly. "I've been trying to figure out how that key managed to get into my room. I am not a crook! I did not take that key!"

Bro B shuffled over to the bed and sat down. "The taking of the key matters little," he huffed. "What does matter is that the only way you could have gotten it was to enter the M-Ditsch's chamber and remove it from his neck."

"I haven't been anywhere near his damned chambers. Besides, how could I get it off of his neck when I can barely reach up to even a short

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Bingnagian's waist?"

Tears formed in Bro B's eyes. "It would have been easy to remove it, considering that the M-Ditsch had no head at the time." Bro B honked hard into a handkerchief the size of a bed sheet.

Sam rapped his translator. The machine had sure chosen a bad time to go on the fritz. "I thought you said no head,'" he repeated.

Bro honked again. "I did. Whoever took the key slit the M-Ditsch's throat as he was sleeping."

"He's dead?" Sam said incredulously.

"Alas, that is what happens when someone removes your head," Bro B said sadly. "Now there is no opportunity for me to slip a knife into his back like the good, loyal successor he wanted. Oh, the shame of it all!"

Sam was aghast. Without a Ditsch there was no hope of resolution with the Gormlies. How could he hope to resolve their dispute if there was no one on the Bingnagia side to sign an agreement? But why was he worried about that, as he went over what Bro B had said; there were more important things to be concerned about. "You think I did it!" he whispered with dawning amazement.

Bro looked down at him. "Of course I do. And it is my fault for inviting you into the keep where you could use your alien wiles to destroy our most adored Ditsch. I will be under the foot with you when the judgment is passed for my part in this crime."

"Under foot?" Sam asked.

"Yes," Bro B replied. "The penalty is stomping."

Gulp. "You did say we'd be *stomped*, didn't you?" Sam had no desire to have his lifetime postage canceled by the heavy-footed Bingnagia judicial system. He was too young, too vital, too *human* to die. No, there had to be a way out of this. He left the side of the disconsolate Bro B and began to pace the floor. "We need to think this through. First, I didn't do it."

"You didn't do what?" the translator blurted.

"Murder the M-Ditsch," Sam replied absently. "You must know that."

"Why should I?" the translator queried.

"Because they found the Ditsch's golden key in my room after the murder," Sam replied testily. "Why are you asking me these questions, Bro B?"

"Pardon?" Bro hooted. "Did you say something?"

"Just answering your questions," Sam replied. "It surprised me that you would follow Earth's Socratic method."

"I didn't ask you anything."

Sam stopped. "You certainly did. I heard you with my own two ears."

"You are imagining things. Must be a function of those tiny ears of yours." Bro B said and laid down. In a few minutes loud snores emanated from the plank bed.

"How did the key get into your room?" the translator asked.

Sam glanced around. There was no one to be seen and he was certain that Bro B was not one to snore questions in his sleep. "Ghosts," he said without conviction.

"Well, aren't you going to answer my question?" the translator blurted impatiently.

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Sam was astounded. In all the months he had used the Rix machine he had never realized that it was intelligent enough to have a conversation. Perhaps there were other aspects of Rix technology that he had not yet learned to appreciate.

"Yes, how the key got into my room is the, er, key to this whole mystery. Whoever put it into the napkin knew that would get me in trouble."

"So all we have to do is discover who could have access to your room."

Sam considered. "Well, that would be all of the Bingnagians in the compound, plus the visiting Adrinns and the Gormlies. Matter of fact, I think I am the only one around here who *didn't* want to kill him!"

"Then the questions are both motivation and who had access to the M-Ditsch's sleeping chamber."

"True," Sam replied. "I don't see how one could get into it. There were an awful lot of locks on that armored door and I'm sure that he didn't welcome visitors. I can't see how anyone could have gotten in there."

"Then you will have to find out, won't you?" the translator concluded. "Maybe Bro B has the answers to these questions."

An awakened Bro B was indeed the source of the answer to the access question. According to the guards who had discovered the body, something had climbed through the chamber's air duct, loosened the grille above the M-Ditsch's bed, and dropped down. "The perpetrator left by the same means," Bro B concluded. "Or maybe he left by the door, using that key you had."

"Urk," Sam said.

"Why couldn't one of you go through the duct?" Sam asked. "All of you wanted to succeed him."

Bro B laughed. "That would have been impossible. The ducts are far too small for anyone of my race. Besides, most Bingnagians are so claustrophobic that we wouldn't dare enter such a confined space."

"So they think that I crawled through the duct?"

Bro B nodded. "Yes, and they assume that we were in cahoots."

"So I must have opened the M-Ditsch's door for you? I assume that they also think that you killed him."

Bro B nodded agreement. "That couldn't be true, Sam. Everyone knows that I'd stick a proper knife in his back instead of cutting his throat. No, I am not the killer."

"Which means that it was either me or the Adrinns who did this," Sam said.

"Couldn't be the Adrinns," Bro said. "They wouldn't have the strength to slit the Ditsch's neck like that. It took someone much stronger, much larger. Besides, I had the guards watching them every minute. No way they could have gotten out of their room to do this."

"Which leaves me as the only candidate for stomping," Sam concluded gloomily.

That afternoon his Adrinn drinking buddies paid a short visit. "Sorry, sorry," they exclaimed as they crawled over him and sniffed his feet. "Bad, bad," they said sympathetically and left with their ever-present guards.

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Their concern brought a tear to Sam's eye.

In the evening a motley-clad, gray-skinned Pequodista was ushered into the room. The Peq's multiple layers of clothing rustled as it placed its wooden document case on the floor beside it.

The tendrils on the Peq's head beat on the rose-colored, inflated bladder at the alien's throat. *Hmmmm, mmm, hmmhhm*—"Name's Oncccc, Bingnagia representative on planet. Ahbbbb heard that the Hegemony Court was coming and asked me to intervene. You know, get you out of here before the Clerk of Court arrives."

"How the hell did. . . ." Sam began. It shouldn't have been possible for Ahbbbb to have heard of his arrest and reacted so quickly.

"We watch out for our assets," Oncccc replied and then seeing the expression on Sam's face, said, "Ahbbbb contacted me as soon as she heard about the murder. Wanted you to have the very best representative."

"That was a *very* fast response," Sam observed, "considering that I was just arrested this morning."

The Peq's tendrils drummed quickly; "Oh no, she heard this days ago. I must say that the Glimmoras are quite upset by your conduct and swear they will never transport humans again, at least not without a cage for them. Can't say I blame them—they do try to protect their passengers as much as they can. They insist that I bring you to Glimmora so we can provide a decent explanation."

Sam's puzzlement grew in leaps and bounds. "Glimmora? What are you talking about? I thought you were here because of the M-Ditsch's murder!"

Oncccc drew back, his tendrils shot straight out in amazement as his hands disappeared into the depths of his paisley robes. "*Another* murder?" he hummed. "You are *quite* the little predator, aren't you?"

"I didn't kill anyone," Sam protested. "I'm just a human negotiator, a simple Earthman, not some cold-blooded killer!" Seeing the expression that passed over the Peq's face at the unintentional insult, Sam added, "Nor hot-blooded, for that matter."

"Well, so you say," the Peq hummed. "But how do you explain the gentleman that disappeared while he was with you? The ship's auto-chef says that you admitted eating him."

Sam felt his stomach sink as he recalled the incident. "I wasn't serious when I said that. I just got so mad at that stupid auto-chef that I wanted to put it in its place. It was a joke," he finished weakly.

The Peq blanched. "Nevertheless, you did admit that you did away with the Tsith! Oh, this is terrible. Terrible! I had hoped that it was some sort of misunderstanding, although it would be hard to deny, considering that the ship has a complete transcript of your confession. My dear friend, I do not think there is anything that I can do for you. Nothing at all."

There was a commotion in the hall outside, with considerable huffing and hooting that Sam's translator couldn't handle. "What is it?" he asked Bro B.

The huge Bingnagian put its ear close to the door and listened for a

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few moments, then turned to face Sam and Oncccc. "It's about the Court Clerk. They just received notice that it's on its way here." He listened for a moment more and then drew back in obvious distress. "Gods in dirt; they're saying the Court is sending a D'ret!"

The Peq blanched, or at least turned a lighter shade of gray. Even Sam could see how Bro B's legs trembled.

"What's a D'ret?" he asked innocently.

"The most fearsome creature in the galaxy," Oncccc explained hastily. "One hundred meters tall, armor-plated, an IQ of one thousand (that's on an exponential Baysean scale, you understand), with a personal arsenal of firepower that no galactic can possibly withstand. Why, I once heard," he added in a soft hum, "that a D'ret destroyed an entire planet just because they didn't fuel his ship fast enough. It only took two of them to destroy an entire solar system that the Court found at fault. Nobody screws with a D'ret!"

"We've got to save our people," Bro B shouted and started pounding on the door. "We have to select a new Ditsch and settle with the Gormlies before it gets here," he hooted loud enough to be heard over the rising din. "That's the only way we can stop the D'ret's visit!"

"I've got to get the *Hmmmhhhh* out of here!" Oncccc declared. Apparently, that word was not in the translator's dictionaries. With a flurry of fabric the Peq picked up its case and began to use it to hammer on the door. "Let me out! Let me out!" he hummed. The heavy thumps of Bro B's blows were interspersed with the softer ones of the panicked Pequodista representative. It made a percussive counterpoint that sounded vaguely like Earth's latest riparian mood tunes.

"Wait a minute," Sam protested as the Peq continued to bash vainly on the door. "You can't leave me here. You can't just leave me here to be stomped to death by these monsters."

"Hey, who are you calling a monster, you puny alien," Bro B said and advanced on Sam.

Sam ducked to hide behind Oncccc's billowing robes. "No offense intended, believe me," he said. Sam dodged a swipe of Bro B's claw when Oncccc moved left, leaving Sam unprotected. He dodged right and then left, directly into Bro B's backhand.

Sam tumbled head over heels and fetched up against the bedpost. Something clattered to the floor beside him.

"What's this?" Bro B said and picked it up. "How did you get the key to the door?"

"Key?" Sam replied. That was the second thing that mysteriously appeared in his possession. Was he a subconscious poltergeist, wafting things hither without conscious thought? No, he concluded; he'd never shown a gram of psi in any tests. There had to be another explanation.

"Damn if it don't work," Bro B hooted from the now opened door. "Come on!"

Oncccc ran out like a boutique pursued by fabric-starved seamstresses.

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He was followed quickly by Sam and Bro B.

Pandemonium reigned in the hallway. Bingnagians ran hither and yon, gathering things and racing off with them. Several seemed to be boarding up the windows. A few were busily locking every door in the long hall. Others were unlocking the same doors to deposit goods taken from other locked rooms. The din of hoots and hollers was so great that Sam's translator couldn't keep up.

One advantage of the confusion was that nobody seemed to be paying the escaping trio the slightest attention as they fled down the hall.

"I have a small ship nearby," Oncccc hummed over the braided golden epaulets on his shoulders. "If you can get me to the field I can get both of you off the planet."

"And I won't get stomped to death," Sam and Bro said in two-part harmony. "Let's go!"

As they passed Sam's former room he glanced inside. To his surprise several Adrinns were busily lifting something into a carrying case. Sam stopped, curious as to what possession of his could possibly be of interest to the little creatures. He stepped closer.

"Come on!" Oncccc said impatiently and tugged on his sleeve. "We don't have time to sightsee. You don't want to be stomped, do you?"

Sam waved him off. "I don't understand why the Adrinns should be stealing something of mine."

"What are they doing?" the translator barked.

"It looks like they are stealing Dratte Five's gift; the one they were playing with in the pool," Sam replied. This was a fine time for the intelligent machine to once again take an interest in his mundane doings. Where was it when he needed decent advice?

"He said to come on!" Bro B hooted angrily, swept Sam off his feet, and tucked him under one pair of arms. Sam had a brief glance at Oncccc, who was held tightly under the other two arms as Bro B thundered down the hall on all four legs, scattering lesser Bingnagians to each side as if they were kettle pins.

The outer door to the compound was standing wide open. A steady procession of Bingnagians carried papers and boxes from the keep and threw them into a line of waiting vehicles.

Bro leaped into the first vehicle they came to and dropped Oncccc and Sam onto the seat beside him. He stomped a pedal with one foot, grabbed a handle projecting from the floor with his minor claws, and pulled on the overhead cord with his huge fore-claw. With a scream of steam, the vehicle lurched into motion, nearly running down the squad of guards that still marched stolidly to and fro under the direction of their befuddled officers. The vehicle roared out of the compound and raced down the road toward the field and Oncccc's waiting shuttle.

"I think this is a mistake," the translator whispered to Sam. "Flight from adversity is never a wise course."

"So what?" Sam replied. "I come from a long line of stupid people who

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ran away from danger and had kids. The wise ones who didn't run dropped out of the race long ago."

"One cannot flee when wrongly accused," the translator countered.

"Better to be wrong and alive than dead right!"

"The explanation and your vindication are at hand. You have only to recognize it to clear your name, Sam."

Sam was about to reply when Oncccc shouted. "That's it, the gray one!" The Peq pointed at a large, bulbous monstrosity that looked as if it were the bastard offspring of a spaceship and a rutabaga. "Get us as close as you can."

All across the field ships were taking off, rising into the sky on columns of the muddy brown smoke that were the by-products of phloomb-activated propellants.

"News of the D'ret's arrival must have spread quickly," Sam said. "It looks as if we aren't the only dumb ones who want to get the hell out of here!" He held one hand over the translator's speaker to prevent a reply.

Oncccc jumped from the truck the instant it stopped and raced to spin the locks on the ship's hatch. No sooner was the hatch opened than he was inside. In seconds they heard the sounds of the ship's readiness. "Come on," Oncccc hummed loudly enough to be heard over the racket.

Sam and Bro B stood on the tarmac at the foot of the ship. "After you," Bro B said and waved a claw at the waiting hatch.

There was something about the way Bro B was standing, something about the tone of his hoot that made Sam suspicious. "You aren't going with us, are you?" he said. "You are going to stay here to help them deal with the Clerk."

Bro B nodded slowly. "I was the M-Ditsch's successor. I have the responsibility to help my people. I can't desert them at a time like this. It wouldn't be honorable."

"He's right; honor is very important," the translator chirped independently. "What are you going to do, Sam? Think about your contract to help the Bingnagians. Think about your honor."

"I'm going to get on board and get the devil out of here!" Sam said as he took a step toward the ship. "There's no way I can help the Bingnagians now."

"So you will allow the Bingnagians to revile humanity forever? Aren't you concerned about your reputation?" the translator chided.

"The only way you can enjoy a good reputation is to be alive, which I intend to remain for considerable time to come. What good would my unblemished reputation be if I get stomped by the Bingnagians or wiped out by the D'ret?"

That seemed to have stopped his conscientious translator for a moment, Sam thought as he clambered up the ladder to the hatch. Just before climbing inside he turned to wave farewell to Bro B.

The sight of the huge Bingnagian standing by the vehicle, steadfastly remaining on the planet of his people while knowing that he faced certain death and disgrace, touched Sam. "Duty, honor, country," the translator

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whispered as strains of tinny martial music played along. "It is a far, far better thing . . ."

"All right, damn it! All right!" With a sigh Sam slammed the hatch closed, climbed back down, and walked over to the truck. He and Bro B stood there and watched Oncccc make his escape. "Home, James," Sam said as he climbed aboard the truck.

"My name's Bro B, Sam," the Bingnagian replied as he threw the truck into gear and turned it around. "I really appreciate you helping us even though we are going to have to really stomp you when the D'ret gets through with us."

"Service is my middle name," Sam said disgustedly with a backward glance at the departing ship.

As they drove through the massive confusion surrounding the field, Sam thought about what the translator had said. The answer to everything was in his grasp, was it? Well, let's see: Motivation, access, and size were the keys to the mystery of the M-Ditsch's death. Somehow, the translator must know that solving that murder would resolve all of the other issues. It was nice that the little machine had such faith that Sam would put it all together.

He wished that he had as much faith in himself.

There was a hubbub around the entrance to the Ditsch's keep when they arrived. A dozen Bingnagians were helping the group of Adrinns load their sled. It appeared as if the little aliens, like any other sensible being on this benighted planet, were about to depart. Sam couldn't blame them for not wanting to meet the esteemed Clerk of the Court in person. He thought that this behavior displayed a degree of intelligence and grasp of the subtleties of the situation far in excess of what they had formerly displayed.

Bro B joined the crowd, hooting a storm of directions that organized the others into a smoothly efficient line. Sam could barely hear the translation of the tiny barks of the Adrinns's protests through the din of thundering instructions.

"We are in a hurry," one of them chattered.

"We have a ship to catch," another added.

"Our business is at an end. You must deal with the Clerk now," a third one barked.

"I see no reason that you should stay," Bro B huffed loudly. "You did your best."

"Yes, yes. Now please move aside. We are anxious to leave this terribly wet planet. It is very unhealthy for us," the smallest one said as the Bingnagians threw the last box on the sled and stepped back to let the Adrinns continue on their way.

Wet planet. Something clicked in Sam's mind: Weren't these the same aliens who had splashed about in his pool with such abandon just the night before? "Just a minute," he said as he stepped in front of the Adrinns' sled. "I think that you have something of mine."

"Out of the way, you murderer," Adrinn One barked as Sam reached into the sled and pulled out a large box. "Hey, stay out of there. That's ours."

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Sam opened the box and pulled out the uneven lump that Dratte Five had left for him. "Now what is this?" he said, turning it over in his hands so that everyone could see.

"That's the thing you had in your room," Bro B huffed. "Why do the Adrinns have it?"

Sam examined the lumpish sphere. Had it changed since he saw it last? Were those scales in the same place?

"I think we all need to return to my room," Sam suggested. "I think I know how to stop the Court Clerk and . . ." The thunder of stomping feet as the Bingnagians raced them to the room drowned out the remainder of Sam's statement.

The Adrinns and Sam were carried ungraciously but efficiently by Bro B and several guards. "Now, explain yourself, human Sam," the large Bingnagian said once they were all inside.

"There are three elements to who killed the M-Ditsch," Sam began as he tossed the sphere into the pool. "The first is motivation," he explained as he turned back to the crowd. "Who, I asked myself, would benefit from the death of the M-Ditsch on the eve of an agreement?"

All of the Bingnagians shuffled their feet nervously. It was no secret that every one of them coveted the Ditsch's position and was ready to put a blade into his back. Bro B, as the prime candidate to become the Ditsch, would be the obvious suspect.

"Well, I know what you are all thinking," Sam interrupted their guilty thoughts, "but you are wrong. Simple ascension to the leadership wouldn't be enough to commit murder and then not take credit for it. A Bingnagian would have slipped the blade in and then bragged about it, wouldn't he?" A series of nods of agreement came from the huge aliens.

"Neither would the Gormlies benefit, even if they were able to handle something as large as the Ditsch. Failure to sign an agreement meant that the D'ret would deal both races a rather severe setback. No," he said, shaking his head, "I think the Gormlies are as innocent as the rest of you."

"Then who could it be besides you?" Bro B hooted.

"Consider: once the Court's Clerk got through with the Bingnagians and the Gormlies there would be no opposition to someone else developing the planet. Now who here has an interest in that?" All eyes turned to the Adrinns, who fidgeted nervously with furtive glances at the pool and the doorway.

Sam continued. "Then there is the matter of access to the Ditsch's chambers," Sam explained. "As you all observed, only the Adrinns and myself would fit in the duct the killer used to enter the M-Ditsch's chambers."

"But you were the only one who wasn't under constant observation," Bro B protested. "The Adrinns couldn't have done it while the guards were watching them. You said so yourself."

"Which leads to the third question of method," Sam continued. "Only a being near my size could possibly have the strength to slice the M-Ditsch's head off. Isn't that what you said?"

Bro B was astounded. "But Sam, your logic says that you are the only

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one who could have done it. Are you making a confession?"

Sam walked over to the pool, and looked into its depths. "The assumption has always been that there were only the Ditsch's staff, the guards, the Gormlies, the Adrinns, and myself inside the keep. Isn't that true?"

Bro B nodded. "Yes. We have very tight security. Only a bug could crawl in here without our noticing."

Sam stopped, bemused by a sudden thought. "A bug, you say?"

"Yes, is that important?" Bro B answered.

"Not to you," Sam replied with a smirk and glanced at the water. "Come look at this."

The small round package had begun to change before their eyes; unfolding and growing in volume. The water was being rapidly absorbed as the object grew and grew until, after ten minutes, the tub was full of . . .

"Hello, Dratte Five," Sam greeted the Tsith as it climbed from the tub and shook itself.

"Very clever, Sam. Underestimated you. Humans aren't as dumb as I thought," the alien rasped.

"What the hell is going on here?" Bro B hooted. "Where did this thing come from?"

The Tsith inclined one of his antennae toward the towering Bingnagia. "Pleased to meet you. Right honorable Dratte Five Decline, FSF, ASFSF, IASFM, Admiral of the Fleet, Royal Tsith Companion, and Protector of the Queen's Rump, here. Do I have the pleasure of your company?"

"Dratte Five is a paid assassin," Sam explained to the dumbfounded crowd. "I suspect that the Adrinns brought him here to prevent the agreement that would upset their planned takeover of your planet."

"I still don't understand," Bro B said plaintively.

"Of course you don't," Adrinn One barked nastily. "So long as the Court believed you both to be in dispute you would have suffered the penalties. By the time the case came before the court we would have exploited that planet without having to deal with the middle-beings."

"So you must be the ones who filed with the Court," Sam said smugly, proud that his guess had proven correct. "That was why you didn't want the Gormlies to accept the Bingnagians's concessions. That was why you didn't want the M-Ditsch to sign the agreement."

The Adrinns shifted around, "Yes, it was a good plan, and would have worked if you had escaped as we planned."

So that was why it was so easy to get out of the compound! They must have put the key to the door in his pocket during their visit, Sam thought with dismay.

"But how did this thing get in here?" Bro B wailed. "We have the best security in the universe. We could have detected any signs of life."

"Back on Earth," Sam began, "there are a number of creatures that survive drought by eliminating all water from their bodies as they shrivel up. The glycol allows all of the body's proteins to fold up without damage and that compresses them into what appear to be nothing more than inanimate

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lumps. The tardigrade is the best example of these."

"But I thought that life couldn't be sustained without water!" Bro B protested.

"And that is what your scanning devices are looking for," Sam explained. "Dratte, however, infuses himself with glycol before he eliminates all of the water from his body and uses that to bathe the cells.

"That is what made me realize what had happened. When he originally dried up on the ship, it filled our cabin with moisture, more than the dehumidifier could handle. I didn't realize it when the same thing happened to my room right after the murder. Then, when I saw that the Adrinns wanted to take the Dratte's "gift" back and heard their complaints about the humidity here, I made the connection and figured out how the murder must have been committed." He carefully omitted the role his "intelligent" translator had played in his analysis of the situation.

"Yes, but if your little experiment with the water hadn't worked your whole logical scheme would have fallen apart," Bro B said.

Sam smiled slowly, "Yes, that is true. But all I had to do to prove what I said was true," he smiled as he paused for effect, "was to de-hide Dratte."

The Blattskitt ship docked exactly on schedule. The B-Ditsch, nee Bro B, swung a claw toward Sam's shoulder. "Good-bye, Sam human. I thank you for your assistance and help, both personal and for all of us. I notified the Court this morning that the matter has been settled amicably. The D'ret has been diverted elsewhere and will not come here."

Sam dodged the B-Ditsch's friendly blow and threw a weak counter-jab at his friend's knee. "Think nothing of it. Glad to help." He jumped back from another swing and ducked into the hatch. There was such a thing as too fond a farewell, and, where the Bingnagians were concerned, such could easily prove fatal to a frail human.

He quickly discovered his cabin on the Blattskitt ship to be a masterpiece of galactic engineering; embarrassingly thick bedding, a luxurious, human-shaped and -sized toilet, and a wonderful set of nodes for virtual experiences both blonde and brunette. He could hardly believe his good fortune. Ahbbbb had outdone herself in making these fantastic arrangements, he thought as he sat back on the soft bed and pulled the translator from his belt.

"You can come out now," he said simply. "I know you are in there."

"How did you guess?" the translator asked. "We thought that you believed that intelligent translator story."

"I did, at first, but you sort of overreached yourselves with that martial music bit on the tarmac."

"We needed that for effect," Bunion, the truzdl leader replied. "We were desperate to change your mind."

"Well, you did that. If you hadn't you would have had to resolve the dispute some other way, wouldn't you, Bunion, or should I say Court agent?"

The translator was silent for a long while. "When did you guess that? I

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thought we had a perfect cover."

Sam smiled. "It was the only obvious choice. Who but an official of the Court would bother to help me resolve that situation?"

"True, we had been following Dratte for several months, wondering where he would strike next. We'd heard that the Adrinns had hired him, but didn't know what he had planned. Had we even suspected, we would have intervened much earlier."

"What will happen to the Adrinns now?" Sam asked.

"Oh, we've already sent instructions for the D'ret to change its destination from Bingnagia. It will stop by the Adrinn home system and assess a small penalty. It shouldn't kill more than 50 or 60 percent of them."

"So are you going to leave me now?" Sam asked with a shudder at the casual way Bunion had mentioned a demi-genocide.

"Oh, no!" Bunion replied. "You are so interesting we've decided to stick with you for a while and learn more about Earth and its potential real estate. Matter of fact, that is why we had your accommodations upgraded, courtesy of the Court. We thought that you did such a good job that you should travel in comfort." It paused. "Oh, yes, and have the room for our traveling companion."

Yes indeed, Sam thought as he crossed his hands behind his head and settled back, reflecting on his great good fortune: a luxury cabin, the prospect of fine food, pleasant music, and the promise of good companionship. What more could he want?

There was a commotion in the passageway, a bumping, thumping noise that came closer and closer. Sam walked to the door to see what was going on. Just as he reached it, there was a hearty thump. He opened it.

Snorf, his new cabin mate said amiably as it pushed its gaseous, smelly, blue-haired way into the cabin to rejoin its inhabitants. ■

Editor's Note: Earlier stories about Sam Boone have included "Sam Boone and the Thermal Couple" (October 1995); "Sam Boone's Appeal to Common Scents" (July 1996); and "Sam Boone's Rational Choices" (March 1997).

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Dr. Eugene F. Mallove

COLD FUSION: THE "MIRACLE" IS NO MISTAKE

It's simply not true that "nobody's doing cold fusion research any more" or even that "nobody's getting results." Here's a summary of what's been happening, and a chance to check it out for yourself.

There is something very new under the Sun. The worst nightmare of the aging nuclear physics establishment has come true: there is far, far more to nuclear reactions than "was ever dreamt in its philosophy." The class of heretical, near room-temperature nuclear phenomena, dubbed "cold fusion" since the flamboyant Utah announcement of March 1989, are now confirmed and are beginning to be commercialized. The acid test for any revolutionary discovery—entry to the marketplace—is happening right now for cold fusion, whether or not the critics

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agree. It is now possible to acquire for research purposes a low-power, radiationless, tabletop nuclear reactor for less than $4,000!

The much-maligned press conference by Drs. Martin Fleischmann and Stanley Pons at the University of Utah, on the afternoon of March 23, 1989, occurred, fittingly, less than twelve hours before the Exxon *Valdez* ran aground off the coast of Alaska. Fleischmann and Pons, for those few who don't recall, claimed that they were getting excess thermal energy far beyond electrical input energy from an electrochemical cell with a palladium cathode and a heavy water electrolyte. The cell output, they said, was substantially more than could be explained by any chemical reactions.

Provocatively, they suggested the phenomenon had to be nuclear and they posed some then very weak evidence for nuclear reaction products. Problematic as this initial *nuclear* evidence turned out to be—tritium and neutrons, experiments by others were later to confirm very low level neutrons but utterly unambiguous radioactive tritium, as well as other nuclear changes. If anything, Pons and Fleischmann were too conservative. They had really glimpsed a whole new world of solid-state nuclear reactions. Their press conference, which triggered the present worldwide cold fusion quest, will eventually live not in scientific infamy, as many still imagine, but as the beginning of the end of the Fossil Fuel Age and the birth of new physics.

As for the multi-billion dollar, half-century *hot* fusion effort, whose leaders ran scared after the cold fusion announcement, the end of the road is near. The tokamak reactor Sun-worshippers of Princeton and MIT should start planning new careers, or begin to take cold fusion seriously—as at least *some* hot fusion researchers at labs in Japan, the US, and Russia already have. Hot fusion has never produced a single watt of excess energy, and if it ever does it would be in the form of lethal radiation. Cold fusion, whose primary signature is excess heat with no deadly radiation, exceeded breakeven at birth—in 1989. For budgetary reasons, magnetic confinement hot fusion funding in the US has recently been cut drastically by the Congress. In a few years, this once heroic, now irrelevant white elephant will expire, as scaled-up cold fusion devices penetrate the marketplace. The implications of the astonishing cold fusion discovery will finally sink in. Already, former chairman of the House Science Committee, Robert Walker (R-PA), has publicly acknowledged the reality, importance, and mystery of cold fusion.

Many other "establishments"—including the planet's entire fossil fuel and fission power infrastructure—are also in for rude awakenings. Even hydropower, solar, and windmill energy, which may still have their place in the coming New Energy Age, will be marginalized. It will be extremely difficult, even for contemporary "sustainable energy," to compete with compact, environmentally benign power systems that do not bow to Earth's rotation or the vagaries of weather. The

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electric power grid will wither away as consumers increasingly adopt self-contained domestic power units based on cold fusion, or "new hydrogen energy," as the Japanese official program calls it. Air pollution will plummet and the threat of global warming will dissipate.

It must be said that "cold fusion" is merely convenient historical nomenclature for a class of thermal and nuclear phenomena, not a definitive microphysical explanation as nuclear fusion per se, though fusion aspects are almost certainly involved. The *mechanisms* of cold fusion are indeed still being hotly debated by theorists; no single theory appears to have an edge. The experimental data that need to be explained are still very difficult to put under one umbrella—rather like trying to explain all of chemistry with a single model in 1870!

Paradigm Paralysis

How can it be that eight years after cold fusion's advent, one of the greatest discoveries of all time is being largely ignored or ridiculed by the general media? How has it happened that looming cheap, safe, and abundant energy from water and inexpensive metals like nickel has been pushed aside in favor of media fixation with the likes of O.J. Simpson or Saddam Hussein? Easy. The paradigm-fixed minds of even some otherwise brilliant scientists recoil from the notion that *They* Have Missed Something Very Big; thus they are adamant: "Cold fusion is nonsense!" Regrettably, for pack-mentality journalists these are the only opinions that matter. A few science journalists have followed the story moderately well, but their voices are lost in the silence of the lambs. Not surprisingly, the same ignoring of revolutionary developments happened to heavier-than-air powered flight between 1903 and 1908, to spaceflight between 1926 and the late 1940s, to continental drift from 1912 to the early 1960s, and it will happen again to even greater paradigm shifts.

In many ways, the cold fusion "war" these last eight years bears closer resemblance to the Galileo affair of nearly four centuries ago. The Church fathers refused to look through Galileo's telescope, because they *knew* the sight through that quaint tube could not possibly contradict their understanding of the heavens. If it did *seem* to contradict their opinions, it had to be a mistaken instrument. House arrest or burning at the stake are not the instruments of oppression today, but threats to academic freedom have been severe and stifling to cold fusion investigators. The late physics Nobel laureate and eminent cold fusion theorist, Julian Schwinger, felt compelled to resign from the American Physical Society because of its abuse of the publication process. Professor Peter Hagelstein of MIT, a brilliant laser theorist and former nuclear weapons expert, was nearly denied tenure because of his pursuit of cold fusion. Distinguished Professor John O'M. Bockris at Texas A& M University, one of the world's greatest electrochemists, was attacked and asked to resign by some of his colleagues because of allegations

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of fraud in his cold fusion and low-energy transmutation research. Fortunately, he was fully exonerated despite this latter-day witch-hunt.

Many twentieth-century scientists react the same way to cold fusion as church officials did to the heliocentric theory: they most often refuse to look at the data. To them the "miracle" of cold fusion is a vast mistake, not a window to a new realm that transcends high-energy nuclear physics and chemistry. Abandoning the foundation of science—the primacy of experiment—they arrogantly demand an explanation of the cold fusion anomalies that fits all their preconceived notions of how nuclear reactions must occur. That there could be reactions in the solid state differing from high-energy physics is *unthinkable* to them: What about the seemingly impenetrable electrical repulsion Coulomb barrier between all positively charged nuclei; what about the lack of expected lethal radiation? These are mocked as the two impossible "miracles" of cold fusion. The dozens of intriguing theories that would seem to permit cold fusion reactions are rejected outright.

Noted physicist Professor Herman Feshbach of MIT angrily told me in 1991 (and essentially recapitulated on ABC television's *Nightline,* February 7, 1996, when commercial cold fusion cells were being discussed): "I have had fifty years of experience in nuclear physics and I know what's possible and what's not possible. I don't want to see any more evidence! I think it's a bunch of *junk* and I don't want to have anything further to do with it." In 1991 I had merely suggested that Feshbach examine the excellent review articles about the mounting cold fusion evidence, which had been done by scientists at Los Alamos National Laboratory and the Bhabha Atomic Research Center in India. It seems that it is far easier for the mainstream to believe in alleged fraud and incompetence than to accept hard data in numerous peer-reviewed cold fusion articles, data that contradict long-held tenets of nuclear physics and chemistry.

While the cold fusion triumph is astonishingly good news for the environment and the energy well-being of civilization, it is extremely bad news for business-as-usual, incremental science. Mainstream scientific publications have been loathe to recognize what has been happening these past eight years in laboratories from Los Alamos to Beijing. What *else* have they missed, laypersons will rightly ask? The US Congress should consider hearings in this "HeavyWatergate" affair, an abuse of government power and misappropriation of scientific resources that makes Whitewater and Watergate look like tempests in teapots. After all, how many citizens will have died needlessly as a result of air pollution illness, due to the years of unwarranted delay in the development of cold fusion technology?

The Evidence: Pro and Con

Dozens of laboratories with multimethod cross-checking, especially by many types of heat-measuring calorimetry, have established the cold fusion findings on firm ground. How-

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ever, a theoretical understanding of what these data mean—how the processes work—is not yet at hand. That will come. The only flimsy evidence *against* the reality of these phenomena, from the dark mists of 1989, now lie discredited in several technical journals. The Department of Energy's panel of 22 people who investigated cold fusion claims in 1989, came to a thoroughly unjustified, rushed judgment, less than six months after the Utah announcement. This even as positive results were pouring in from around the world in the fall of 1989 (#1). Not surprising, because several top figures on that ERAB Cold Fusion Panel are on record with statements that the cold fusion claims were "preposterous to begin with."

Furthermore, the so-called "null cold fusion experiments" of prestigious Caltech, the MIT Plasma Fusion Center, and Harwell Laboratory in the UK in 1989 were anything but null. Cooler heads looking back at their data found egregiously faulty analysis, experimental incompetence, and worse (#2-6). With remarkable chutzpah, the anti-cold fusion camp, clinging to its rushed and faulty experiments of 1989, denigrates increasingly perfected positive experiments. The goalposts keep getting moved. It is clear now that *no* cold fusion experiment, no matter how sound or well-published, will be believed by the vested academic interests. It shouldn't be this way, but it will take commercialization—products that heat homes and run cars—to silence the naysayers. As one hot fusioneer at MIT put it in 1993, "I suppose I'll believe it when they drive a car up from New Jersey."

Both the nuclear-scale energy production and nuclear products—low-energy, alchemy-like transmutation of heavy elements in cold fusion—have now been proved. The energy release observed so far from cold fusion reactions is slow (fortunately!) but spectacular: thousands to millions of times beyond any conceivable chemical reaction in those systems—tens, hundreds, and thousands of megajoules per mole of active material in the cells, for those who understand those terms. Moreover, there are no chemical changes in cold fusion systems that could begin to explain the energy release—much less the nuclear reaction products found: transmuted heavy elements, helium-4, occasionally radioactive tritium, and an extremely faint neutron emission (the latter often nonexistent or very near ambient background level).

To be sure, these are provocative conclusions about one of the most reviled, disputed anomalies in the history of science. The opponents say it is all "pathological science," like N-rays or polywater—as though stereotyping with a name can explain away replicated data gathered by some of the finest laboratories in the world. In truth, the data from the best cold fusion experiments are now all but unarguable, except by a vociferous band of professional "pathological skeptics."

In May 1991, when I completed my account of the cold fusion quest to that point, *Fire from Ice: Searching for the Truth Behind the Cold Fusion*

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Furor (#7), I suggested that the evidence for cold fusion phenomena was overwhelmingly compelling. I acknowledged then that there was a remote chance that it could *all* be wrong, and I was not certain that technological applications would emerge quickly. Three other books came out, which took a very hard line against cold fusion, each concluding that the affair was an example of "pathological science" (#8-10). Fortunately for our energy and scientific future, these books concluded incorrectly. They will provide historians with a fascinating view of skepticism run amok. They are each good examples of Arthur C. Clarke's observation in 1963: "It is really quite amazing by what margins competent but conservative scientists and engineers can miss the mark, when they start with the preconceived idea that what they are investigating is impossible. When this happens, the most well-informed men become blinded by their prejudices and are unable to see what lies directly ahead of them" (#11).

Each year since 1991, the evidence for cold fusion has grown more convincing. There are literally thousands of papers now documenting cold fusion phenomena. There were only hundreds in 1991. In the space of a short article it would be impossible to do justice to this large body of literature, but the reader may wish to look into the various international meeting proceedings, compendia, and selected papers referenced below (#12-77). And for those who really see the light and have a burning curiosity about what they have missed, *do* make arrangements early for the Seventh International Conference on Cold Fusion (ICCF-7), which will be held in Vancouver, Canada from April 18-23, 1998. The most recent one (ICCF-6) was held October 1996 in Hokkaido, Japan, not far from Sapporo, where Japan's MITI has set up its "New Hydrogen Energy" (cold fusion) laboratory to coordinate the large but conservative Japanese program.

Japan is even funding work at SRI International in California, previously supported by the research arm of the US private utility consortium, the Electric Power Research Institute (EPRI). The EPRI final report on its $10 million cold fusion research states: "This work confirms the claims of Fleischmann, Pons, and Hawkins of the production of excess heat in deuterium loaded palladium cathodes at levels too large for chemical transformation. . . . Further, the excess energy exceeds that of known chemical processes by two or more orders of magnitude." (#44) It is noteworthy that the EPRI cold fusion program continued, despite the tragic cold fusion cell explosion at SRI that killed electrochemist Dr. Andrew Riley in January 1993.

Drs. Fleischmann and Pons have been vindicated by EPRI, but in other ways too. Leaving the hostility of the US scientific establishment behind, in 1991 they were set up near Nice, France, by a member of the Toyota dynasty, the late Minoru Toyoda. At the IMRA Europe laboratory today, the Icarus-9 calorimeter has produced months of continuous data from cells at boiling temperature, exhibiting ther-

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mal output of twice the input electrical power—all from a tiny palladium cathode. Recently, Dr. Fleischmann has retired to his home in England, but the work in France goes on. In fact, one of the top members of the French Atomic Energy Agency performed a replication of the Fleischmann and Pons calorimetry of a few years ago (#34) and at ICCF-6 pronounced it sound. The European Patent Office has given notice to US-based cold fusion company ENECO of Salt Lake City that the Pons and Fleischmann patent will be approved. Not so in the US, as the war rages in Washington against cold fusion. The Department of Energy continues massive funding for various hot fusion programs and fission power research, but not one cent has been allocated for cold fusion. Any research on cold fusion at national labs has been either "bootlegged" under duress, or paid for out of "director's discretionary funding."

The Patterson Power Cell™ and Beyond

Though the case for a spectacular new class of phenomena connected with special conditions of hydrogen isotopes in contact with metals and other materials is surely proved, we don't know which of the few dozen or so theories best explains the expanding category of anomalous nuclear and nuclear-like phenomena. Dr. Storms calls these "chemically assisted nuclear reactions." An outstanding example, but by no means the only one, of how certainty has built up and how commercialization is occurring despite the lack of agreed-upon theory: Clean Energy Technologies, Inc. (CETI) of Dallas, at a meeting of the American Nuclear Society in Washington DC in the fall of 1996, announced the marketing of a Research Kit based on the patented Patterson Power Cell (#63).

Dr. James Patterson, a former polymer chemist with Dow, is lucky to hold the first of a series of US patents on his cold fusion device, which resembles the Fleischmann-Pons cell, but uses metal film-coated beads as electrodes, rather than bulk metal ones. The patent was granted by another division within the USPTO that had not been privy to the rejection of hundreds of other patent applications for cold fusion by the other USPTO branch. The latter summarily rejects everything connected with excess energy or "nuclear reactions in the cold," often citing news clips by journalists from 1989 as well as now discredited "null" experiments from that era.

At the November 1996 meeting in Washington, Patterson and his colleagues demonstrated his cell's robust excess power production, but the main purpose of the kit is to demonstrate definitive, safe nuclear reactions near room temperature. The kit can be rented for a year for $3,750 and purports to be able to show the numerous transmuted heavy elements in the metal-coated beads of the cathode. Nuclear engineering professor George Miley of the University of Illinois has documented the transmutations occurring in the thin layer of metals coating the beads of this type of cell (#80).

Though the power output of the Patterson Power Cell varies from cell

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to cell, in one instance of operation at the large PowerGen '95 energy meeting in Anaheim, California, my colleague Jed Rothwell measured a thermal power output of 1,300 watts for an input electrolysis power of only 1.4 watts (#67). That was a powerful cell, but the reactive zone of Patterson beads was only 40 cubic centimeters. More commonly, Patterson cells put out 5 to 10 watts with an output/input power ratio from 3/1 to 30/1. The PowerGen '95 device heated the hotel suite so much that the locked air-conditioning controls had to be reset by hotel staff! Skeptics still do not believe this type of experiment. It *is* pretty unbelievable, yet it is real.

Perhaps skeptics will believe this experiment that was conducted by the Motorola Corporation on a Patterson cell. These data were shown by Dr. Cravens, a consultant to CETI, at a meeting in Denver in 1996: after the Patterson cell was initiated by being heated to the proper temperature (65°C), the input power was turned off. There was *zero* electricity going in. The cell continued to put out 20 watts of thermal power as measured by a delta-T across the cell of 15.1°C, at a flow rate of 20 milliliters per minute of water electrolyte. This episode lasted for some 11 hours in the data shown, but Cravens said that the heat-producing reaction took a few days more to peter out! When was the last time you saw an object being cooled by water stay hot as a 20-watt light bulb for days? Case closed. This is the so-called "heat-after-death" phenomenon observed by other workers in the field, notably Pons and Fleischmann, as reported in a 1993 *Physics Letters A* paper (#34). The Patterson Power Cell of CETI has recently made national television news; it was covered on ABC television's *Nightline* and *Good Morning America* on February 7, 1996.

The cold fusion field has brought many surprises like the Patterson Power Cell, the most astonishing of which was finding excess energy and nuclear effects in systems radically different from that of the original Pons and Fleischmann heavy water and palladium electrolysis. The first major shock was the revelation in mid-1991 by Randell Mills and others (#51) of massive excess heat production in ordinary water cells using nickel cathodes and potassium carbonate electrolyte. NASA tests have confirmed this excess heat production. The Patterson cell also is based on ordinary water, which, of course, contains a tiny amount of heavy water, so it is still not clear what the critical fuel is.

Mills and his colleagues at Hydro-Catalysis Power Corporation in Malvern, Pennsylvania, are known to have abandoned their original electrolytic approach in favor of hydrogen gas-fueled cells using proprietary nickel catalysts. These cells produce extremely high temperatures, which Mills suggests comes from his "hydrino mechanism"—the catalytic shrinking of the hydrogen atom below the normally understood ground state. Mills distances himself from the mainstream cold fusion community, because he does not agree with the interpretation of the nuclear evidence.

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Yet HydroCatalysis is actively engaged in development that could lead to a one-kilowatt electric generator within the next few years. Theory aside, his company might well be in the lead toward the goal of commercial electrical power generation, but there is competition. Piantelli's group in Italy (#35, 36), supported by Fiat Corporation, likewise has confirmed non-chemical power generation in high-temperature gas-phase cold fusion systems. Dufour in France has found excess power in hydrogen gas-metal cells employing mild electrical discharge (#91).

T. Mizuno's group in Japan and Professor Richard Oriani at the University of Minnesota have pioneered "solid electrolyte" ceramic proton conductors, which operate at hundreds of degrees centigrade and appear to have demonstrated power ratios of up to 70,000 to 1! (#54, 61) Though spectacular in performance and confirmed by several types of calorimetry, the proton conductors have not been especially reliable. If they could be made to work consistently, they might become the most prominent method in the field.

Professor Arata in Japan, one of the key pioneers in that country's hot fusion effort, is now firmly in the cold fusion camp. He has mastered a "double-cathode" technique using palladium, in which prodigious quantities of energy and corresponding helium-4 production has been observed (#18, 19). He doesn't hesitate to call this cold fusion. In fact, at the recent ICCF-6 in Hokkaido, there were at least five groups reporting evidence of helium-4 production in cold fusion cells—one of the goalposts that was long ago moved off the map by the skeptics.

The tritium evidence was the clincher for my firm acceptance of cold fusion in 1991. Since 1989, dozens of cold fusion experimenters have seen it. This tritium is *cold;* that is, it does not emerge with corresponding high-energy neutrons that would be expected if it were created in the standard hot fusion reaction. Since tritium has a half-life of 12.5 years, it can't easily have been in the systems as contamination. Besides, such contamination was rigorously checked for. The final report of the politically ill-fated Utah National Cold Fusion Institute (1991) contains clear descriptions of *reproducible* tritium generation in experiments by the ultra-cautious electrochemist Dr. Fritz Will (who was then less convinced about the nuclear explanation for excess heat). These have been published in the *Journal of Electroanalytical Chemistry* (#76, 77). Tritium has been reproducibly generated in gas-phase cold fusion cells by the Claytor group at Los Alamos National Laboratory. This work parallels Russian experiments that also get reproducible, cold tritium.

Perhaps most astonishing of all is the observation of radioactivity *reduction* in cold fusion systems! As this article went to press, CETI announced it had been awarded a US patent on an electrolytic process for reducing the radioactivity of thorium and uranium. Patterson's group has found that radioactive materials placed in a special

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matrix are reduced by over 90% in periods less than 24 hours—compressing into hours what nature takes billions of years to do. There are at least three other groups who also claim to be able to do this, by other methods which have yet to be awarded patents. The path is now wide open to clean up the radioactive waste produced by the moribund fission industry and the nuclear weapons enterprise—both here and abroad.

The Tip of an Iceberg?

To those who have not followed the field, the conclusion that an energy and new physics revolution is at hand may seem rash. However, the evidence for the anomaly of excess energy production at levels that cannot be explained by chemical reactions has not gone away. Instead, it has appeared in an increasing variety of different chemical and physical systems. I know of no physical effect with even a hint of commercial potential and social benefit that was not eventually scaled up and commercialized. Look what has become of the flimsy transistors of the late 1940s, not to mention the weak, originally disparaged electric light bulb of Edison in 1879!

Nor have the numerous by-products of nuclear reactions occurring near room temperature gone away: heretofore these were thought to be totally impossible. With each passing month these lines of evidence get stronger and stronger as they are revealed with a multiplicity of experimental techniques. These impressive results are increasingly appearing in peer-reviewed journals, such as *Physics Letters A*, the *Journal of Electroanalytical Chemistry*, the *Japanese Journal of Applied Physics*, and *Fusion Technology*, to cite but a few examples.

It is abundantly clear now that the widely denied discovery of Fleischmann and Pons was but the "tip of an iceberg," in which the boundary between chemistry and nuclear physics will be demolished forever. "Cold fusion" may or may not be literally the "fusion" of hydrogen isotopes at room temperature, although some theorists at the US Naval Research Laboratory, Drs. Scott and Talbott Chubb, still think it is. Whatever the detailed microphysical explanation turns out to be, it will, in part, involve nuclear reactions. It will also have to incorporate the release of macroscopic energy at prodigious levels that are *consistent* with nearly radiationless nuclear reactions.

You may think that alchemy has risen from the grave. It has. The transmutation of heavy elements in presumptively "chemical" systems has been prominently observed in a variety of cold fusion experiments (#23, 24, 78-81). In recent years, the evidence for nuclear transmutations of a variety of cold fusion experiments continues to pile up. The CETI cell is, in effect, the world's first commercially available transmutation device. Open any of the recent issues of *Infinite Energy* Magazine, and you will find technical papers by researchers in the US and in Japan that document these transmutations. Isotope distribution shifts have been seen in existing electrode elements and the creation of new elements with highly non-nat-

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ural isotope abundance ratios has been observed. The latter evidence rules out the possibility of any type of preexisting contamination to explain away the transmutation evidence.

Physicist Dr. Kevin Wolf at Texas A&M University, who has been highly skeptical of cold fusion, nonetheless performed a Fleischmann-Pons-type experiment in 1992 and serendipitously discovered unambiguous gamma ray evidence of no less than seven radioactive isotopes that were formed in his palladium cathodes—isotopes of rhodium, silver, and ruthenium. (In 1993 and 1994 this researcher chose not to publish his results, so as not to be ridiculed by his physicist colleagues.) With the tacit approval of an administrator at EPRI, we published the Wolf results in *Infinite Energy* (#82). The implications for other areas of science of the transmutations phenomenon, for astrophysics, chemistry, geology, and possibly even biology, may very well be profound.

Do we know for certain that the nuclear "ash" that has been found in cold fusion experiments actually explains the associated energy releases? The answer is a qualified *no*. The existing "cold fusion dogma"—if there can be any such thing as "dogma" in so heretical a field as cold fusion—is that the ash will be found to add up to be commensurate with the thermal energy releases, in the sense that the mass loss by the identified reactions will translate in an $E=mc^2$ sense to the liberated energy. However, others have speculated that the existing ash is merely the auxiliary evidence of something even more profound: the tapping of Zero Point Energy (ZPE)—quantum vacuum fluctuations, or space energy. Certainly, at least a few excellent papers show that, in principle, there would be no violation of the conservation of energy from the tapping of ZPE (#85, 86). The answer to whether cold fusion is "merely" a whole new class of benign, nearly radiationless nuclear reactions, or whether it is an even a more potent energy source such as ZPE, will emerge in the coming years.

Apart from its revolutionary technological applications here on Earth, if cold fusion is "just" benign nuclear reactions, we will soon own the Solar System, figuratively speaking; if it is ZPE-tapping, we will own the stars! I predict that cold fusion technologies will revolutionize spaceflight, almost overnight, as soon as the reactions are tamed in small, commercially available reactors. We will have not only cold fusion-driven electric power modules for satellites, space stations, and deep space probes powered by ion engines, but also perhaps high-thrust-to-weight rockets that can launch safely and cleanly from the Earth's surface. Cold fusion is cold by multi-million degree hot fusion standards, but some effects seen already are really hot—not so "cold" as to preclude high-thrust air-breathing or rocket engines.

There are even a few well-documented other claimants that may be part of the cold fusion "iceberg." Cold fusion has inspired others to take a look at water cavitation devices such as the Hydrosonic Pump™ of Hydro-Dynamics, Inc. of Rome, Georgia, which we find is almost certainly

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"over-unity" in energy production at the multi-kilowatt level. I and my colleague Jed Rothwell have performed our own measurements on this steam or hot water-producing apparatus and find it substantially over-unity—from 10 to 30% more thermal energy out than electric power input to drive the system's electric motor. Other engineering investigators have found the same results. The collapsing cavitation bubbles within the hydrodynamically shocked, thin water annulus of this device may have something to do with how excess power is being produced. Perhaps the effect is connected with *sonoluminescence*, the light from such cavitating bubbles, which Eberlein (#86) explains as ZPE-tapping? These devices are already being sold for their numerous environmental benefits, whether or not their over-unity effect is real.

Finally, we cannot fail to note the Pulsed Abnormal Glow Discharge (PAGD) reactor of Drs. Paulo and Alexandra Correa, of Labofex in Concord, Ontario, Canada (#88-90). This patented vacuum tube electrical discharge device self-oscillates in an unusual electrical glow discharge regime, which was apparently overlooked by earlier observers this century. Its performance is extremely well-documented in United States patents. Driven by an input battery pack, it charges up an output battery pack. These input/output packs have been interchanged in runs lasting many hours and it is found that *both* packs have higher charge states when the process is over. There is no electrolytic "fuel" conceivable to explain this phenomenon. The tubes are fashioned of glass with aluminum electrodes and ordinary gases. Moreover, the inventors are behaving as good scientists, not like some paranoid folk who have made similar claims without extensive documentation. If this device is real—and it *does* seem to check out so far—all bets are obviously off about the future course of physics and civilization.

Any Fallout?

The technological and social implications of "cold fusion" are as astonishing as the scientific ones. It means nothing less than the end of the Fossil Fuel Age, the demise of fission nuclear power, and the beginning of a water-fueled—a hydrogen isotope-fueled—civilization. Energy will be cheap and environmentally benign. The fuel reserves (if there really is any atomic *fuel* [except ZPE] at all) are effectively infinite and available to all nations. Moreover, prototype cold fusion systems that can heat homes and produce electricity are emerging right now. The time scale for development is uncertain, however. Development and research funding has been extremely difficult to come by. The most bold venture capitalists seem to freeze when contemplating potentially trillion-dollar enterprises. A bit "too big for their plates" may be the problem! Still, it seems likely that in the next few years kilowatt-level reactors producing heat—and perhaps electricity—will come onto the market.

With these devices, the scientific and technological revolution will accelerate dramatically. Skeptics who

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felt comfortable attacking alleged "subtle mistakes" in cold fusion experiments, will be hard-pressed to deny these practical devices; they will certainly try. But money talks. When the largest industrial corporations in the world are forced to rush belatedly into cold fusion R&D—as some already have done, particularly in Japan, but increasingly in the United States—the controversy will be over.

The scientific establishment was and still is dead wrong about cold fusion—catastrophically so. Just as at the end of the 19th-century X rays and radioactivity shook things up, a hundred years later the nightmare for believers in "the end of science" has crawled out of the laboratory and is beginning to shatter contemporary illusions of scientific certainty.

There will come a time—one hopes and expects within the next few years—when cold fusion energy will be completely accepted by the scientific community. Apart from the scientific and technological consequences of the phenomenon itself being ratified, may we expect a change in the way the scientific establishment conducts its affairs? It is difficult to say.

The embarrassment of those who went far out of their way to criticize cold fusion and interfere with its development will be profound. The media and books have meticulously chronicled the statements of the opponents, so there will be no hiding from the record of verbal assaults and acts of censorship and suppression that were made way past the "eleventh hour." To cite but one example: Magician James Randi writing in the *American Physical Society News* (June, 1994), "The 'cold fusion' farce should have been tossed onto the trash heap long ago, but justifiable fear of legal actions by offended supporters has stifled opponents. . . . At the risk of being unbearably realistic, I must tell you that Elvis Presley is really dead, the sky is not falling, perpetual motion is a chimera, cold fusion is a dead duck, the Earth is not flat, and the fault lies not in our stars, but in ourselves."

We might expect that *some* opponents will come forth with apologies for their behavior, but if the past is any guide, most will just silently slip away. It will not be as easy for magazine editors such as John Maddox, formerly of *Nature*. They will be obliged to begin treating cold fusion scientifically. Maddox will have to do some fancy footwork to explain his past policies. At least *some* journalists, who adopted a generally negative line, may turn on their former mentors in hot fusion and high-energy nuclear physics. That would be a way for them to salvage their own reputations.

Even with massive attempts to rewrite the history of the past eight years, the public may well not be fooled this time. They will see clearly what the entrenched scientific establishment did to one of the most important scientific discoveries of our age. Led by political commentators who normally don't interest themselves in scientific controversies or science policy, the people will be outraged at government-university malfeasance in the cold fusion affair. Then it may then be much more difficult for the scientific establishment

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to defend its expensive programs. The question will be, "Why were billions of dollars lavished on the SSC and hot fusion, while nothing was spent on cold fusion—except to pay the hot fusion people to knock it down?"

Following the anti-cold fusion debacle, it is possible that a new science paradigm may gain wider currency, in which reports of unusual phenomena will be treated with the scientific respect they deserve. On the other hand, it could turn out to be just business-as-usual in science, with few lessons learned. That is hard for me to conceive, but stranger things have happened, have they not? It is certain, however, that it will eventually be impossible for a scientist to say of some new disputed anomaly, "That's nonsense, just like cold fusion." ■

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Since 1995, Dr. Mallove has been the Editor-in-Chief and Publisher of the bimonthly *Infinite Energy* Magazine: Cold Fusion and New Energy Technology, based in Concord, New Hampshire. He has a Master of Science degree (S.M., 1970) and Bachelor of Science degree (S.B., 1969) in Aeronautical and Astronautical Engineering from the Massachusetts Institute of Technology and a Science Doctorate in Environmental Health Sciences (Air Pollution Control Engineering) from Harvard University (1975). With broad experience in high-technology engineering at companies including Hughes Research Laboratories, TASC (The Analytic Science Corporation), and MIT Lincoln Laboratory, he has also had extensive hands-on experience in laboratory settings—more recently in cold fusion calorimetry. Since 1991 he has worked as a consultant to US corporations doing and planning R&D in cold fusion. He is the author of three science books for the general public, including the Pulitzer-nominated book on cold fusion—*Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor* (John Wiley & Sons, 1991). He has taught science journalism at MIT and at Boston University; he was Chief Science Writer at the MIT News Office when cold fusion erupted. Prior to that he was a top science writer and broadcaster with the "Voice of America" in Washington, D.C., and also wrote science and technology articles for magazines and newspapers, including MIT *Technology Review* and *The Washington Post*.

He knows nothing; he thinks he knows everything—that clearly points to a political career.

—George Bernard Shaw

The measure of a man's life is the well-spending of it, and not the length.

—Plutarch

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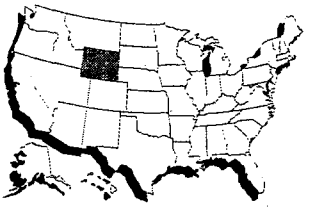
Jerry Oltion

THE SPACE PROGRAM



What could be a more radical approach to politics than this?

"Issues are the last refuge of a scoundrel."

—Jerry Brown, governor of California, 1976

It was the cocktail party from hell. Curtis Brannon, independent candidate for governor of the state of Wyoming, had been to a few bad ones during his three months in the spotlight, but this definitely took the prize. The room overflowed with out-of-work miners, out-of-work cowboys, out-of-work oil-field hands, and dozens of other economically disadvantaged voters, none of whom had any business trying to look comfortable in a suit and tie.

There were even a few out-of-work accountants in attendance, but none of them looked particularly comfortable either. Nor did the two employed ones in charge of Brannon's campaign. Contributions were obviously not coming in the way they had hoped. Everyone here supported Brannon's candidacy, but none of them had the discretionary income to help him pay for it.

Another uncomfortable-looking fellow near the punch bowl didn't fit any of the standard profiles that Brannon had learned to recognize. Unshaven, unkempt, and woefully underdressed in a T-shirt and jeans, he had been watching Brannon like a hawk

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for the last twenty minutes and sweating like a pig the whole time, but he hadn't yet worked up the courage to make whatever move he had come here to make. Brannon wondered if the guy had a gun, and if so whether or not he should let him use it. Right now the only sure way to jump-start his failing campaign would be to survive an assassination attempt.

The notion that the mysterious stranger might actually kill him hardly entered Brannon's mind. This guy didn't look like the sort of person who could hit the broad side of a barn with a bazooka. He looked, in fact, like the sort of person who would unwittingly hide *inside* the barn while someone more capable shot at it from outside. Yet he had come tonight to the fund-raiser, which meant that he had at least heard about Brannon, which was more than most of Wyoming's three-quarter million residents could claim. He had to have *something* going for him.

Brannon decided to confront him directly and see what it was.

"Excuse me," he said to the group of timber workers who had gathered around him to complain about the environmental laws. He stepped around them toward the hors d'oeuvre table, and as he drew close he said, "Hi, welcome to the party." He always greeted new acquaintances that way because it implied that the person had not only joined the cocktail party but the Independent Citizens for Brannon party as well.

"Thanks," the guy said. Now that he was closer, Brannon could see that his T-shirt had a picture of the Galaxy on it, with an arrow pointing from the words "You are here" to a spot about two-thirds of the way out. Not bad, Brannon thought. If the guy had to wear a T-shirt to a cocktail party, he at least had the sense to make it a good one.

"I'm Curtis Brannon," Brannon said helpfully, just in case the guy didn't know for sure.

"David Morrison. Systems analyst for Bighorn Bell."

"Ah," said Brannon. Bighorn Bell had started out as a fifty-customer co-op twenty years ago, and had since grown to become the biggest phone company in the western states. From there they had expanded into practically everything: retail marketing, banking, real estate—anything that made money. If *they* got behind Brannon's campaign, his funding woes were over.

Morrison must have seen the dollar signs in his eyes. "Sorry," he said. "I'm on my own time here. But I do have something you might be interested in. Something that'll go a lot further toward winning you the governor's seat than any amount of money."

"Oh?" said Brannon. Did he have some dirt on Paxton, the incumbent? Brannon hated the thought of using that sort of thing, but it could come in handy if Paxton started slinging mud first.

But Morrison said, "I've got a program that can run your campaign for you. It can tell you what to do, where to go, what to say. It can put you in the governor's mansion, guaranteed."

Brannon snorted. "Right."

"I knew you'd say that. So I brought this." Morrison reached for his hind

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pocket. Brannon backed up a step, ready to leap over the hors d'oeuvre table if the guy came up with a gun, but instead he pulled out a thick wad of paper and unfolded it. "This is a forecasting sheet for our last ad campaign. You remember it—two guys fishing while their car phone took care of all their business for them. Here's our projected two-week sales figure for the autocell XT." He pointed to a figure, and Brannon stepped closer so he could read it: 23,418.

"So?"

"So here's the actual sales figure." He pointed to a line farther down the page: 23,417.

"One of our potentials inherited twelve million bucks and bought the model SX instead," Morrison explained. "Turns out his aunt's sightseeing plane caught a downdraft over Machu Picchu and crashed into the Peruvian Andes." He laughed softly. "We hadn't counted on his sudden windfall."

Brannon laughed aloud despite his manager's coaching never to make fun of anyone's misfortune. "Impressive numbers, if they're true," he said. "But what does that have to do with my campaign?"

Morrison held his paper out for emphasis. His hand shook a bit, Brannon noted. But his voice was steady as he said, "Bighorn Bell has the hottest forecasting program in the business. I know, because I wrote most of the code. It can tell you what someone will have for breakfast six months from now if you give it the right data. Or, conversely, it can tell you how to make everyone have green eggs and ham if you want them to." He shrugged. "Or vote for Curtis Brannon. For instance."

For a fleeting moment Brannon enjoyed the fantasy, then he laughed and said, "I don't need a program to do that. I just promise everyone what they want, starting with free money and a winter home in Arizona. Problem is, if I want to stay in office more than one term, I have to actually deliver."

"That's what the program is for. It'll tell you what you can deliver, and what it'll take to do it. And it'll correlate that with what people actually want. We've already got the database for that."

"Sure you do," Brannon said. If they knew what people wanted—really wanted—they would be . . . hmm. They'd be one of the biggest companies in the western states, at the very least.

Morrison nodded. "It's amazing what you can learn by analyzing people's calling habits. And buying habits, of course. And then there's data transmission, bank records—you name it."

"That kind of surveillance is illegal," Brannon said.

"No, actually it's not. Turns out that any information gathered during the course of normal business activity can be used to compile customer profiles. And Bighorn Bell does practically every type of business nowadays."

That much was certainly true, and their success at it was undeniable. Still, even though Brannon had always heard never to argue with success, this was a bit hard to swallow.

"What does your forecasting program say I should promise people in

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order to get elected?" he asked.

"The same old stuff everybody's been talking about for years," Morrison said, smiling. All traces of his nervousness were gone now that he was in his element. "Reduce unemployment, stimulate the economy—you know the line. But the program can tell you exactly what to propose, and how to accomplish it within your first term of office."

Brannon nodded. He'd heard many a special-interest group offer to put him in office if he'd just support their pet project. "So what kind of public feeding trough am I supposed to establish?" he asked. "And how am I supposed to pay for it?"

Morrison shook his head. "No public assistance, no welfare, nothing like that. The program says the best way to get Wyoming back on its feet is to start a heavy launch facility. Compete with NASA for satellite launches, even manned exploration if we want to."

Brannon would have laughed if he didn't feel so let down. Some part of him had been hoping for a miracle, hoping that this kid actually had something. But a space program? That was a pie-in-the-sky idea if he'd ever heard one. "That's not a public feeding trough?" he asked. "Where's the infrastructure going to come from? Who's going to bankroll the research and development? NASA isn't going to just give us the plans for the shuttle, you know."

"The shuttle is obsolete," Morrison said. "Single stage to orbit is the way to go, and there are half a dozen companies that've already done the R&D who are just looking for a place to put their launch site. Wyoming is perfect. Lots of open space, lots of energy, and lots of skilled labor with an overwhelmingly positive attitude about developing a new frontier. All we need is somebody to set it in motion. And the program says whoever comes up with the idea first will be governor come November."

"Does it?" Brannon said. A space program. Sounded like a nutty idea to him. Maybe just nutty enough. Lord knows, it would take something crazy to fix his campaign.

He spent the next week checking out the feasibility of it. He wasn't about to get behind something like this without knowing what he was getting into. But the more he learned about it, the better he liked it. Wyoming was a perfect place for a heavy launch center. It had more coal and oil reserves than most of the rest of the country combined, which meant plenty of energy to make rocket fuel with. It had plenty of open space to drop aborted launches into, and plenty of people who were used to big projects and would jump at the chance to take high-paying rocket jobs. About the only problem that Brannon could see was the high latitude, which would make equatorial orbits more expensive than launching from Florida. Not prohibitively so, however, and Brannon reminded himself that the Russians had learned to work around a worse latitude problem with their main spaceport in Baikonur. Morrison was right: it could work.

He was grinning ear-to-ear at the press conference. That played almost as well on the evening news as the shocked expressions of his oppo-

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nents, who were caught flat-footed by his sudden proposal.

"There's another side to this program, you know," Morrison told him a few months later. Brannon hadn't seen him much since the election; they had told the public about the forecasting program and Morrison was spending all his time at Bighorn Bell preparing it for commercial release.

"What other side?" Brannon asked, hardly looking up from his desk. He was busy with contractors' reports and EPA reports for the new launch complex in Rock Springs. Things were moving faster than he had anticipated; it actually looked like they might launch their first payload within three years.

"It can tell you what else we're capable of. Wyoming doesn't have to be a one-trick state, you know. Next election, we can offer the public a choice of growth options to choose from."

"What kind of growth options?" Brannon asked. He had gotten to know Morrison a bit in the last few months; he wouldn't have brought the subject up unless he'd already run the simulations.

Morrison smiled, took a sheet of paper from his hind pocket, and unfolded it. "Well, there's revamping the park system, for starters. We're already big on tourism, but we could do a lot better if we wanted to. Or there's cultural expansion; theaters and museums and such for our own enjoyment and to attract a higher income class of immigrants. Or there's building a wall around the state to keep everyone *out*. That turns out to be a pretty good short-term investment as far as jobs go, but I can show you why it's bad in the long term."

Brannon laughed. "Good thing. That's what most Wyoming people would vote for if they thought they could get away with it."

"True enough. There's another couple of options we probably shouldn't mention for the same reason, but we've got a dozen good solid plans to choose from. We could lay them all out for people to consider, then in a year or two have a special vote, let people decide the direction the state goes in the next decade or two."

"The next *decade* or two? You can't plan that far out, can you?"

"Only for Wyoming, where we've got the database. And the population here is just about optimum for the forecasting program. But I keep refining it, and Bighorn Bell is selling the program to other states, so pretty soon we'll be able to do it for the whole country. When we get everything all coordinated, we could probably plan fifty years ahead."

"Good God, you're serious, aren't you?" Brannon sat up in his chair and looked straight at Morrison.

"As serious as taxes, which, by the way, we can lower another 2 percent starting next fiscal year."

"How?"

"Increased efficiency. Now that we've got a real direction, we're not wasting so much money shuffling paper around trying to look busy for the voters."

Brannon waved at the mountain of reports on his desk. "You mean this morass of paperwork is *more* efficient than my predecessor's?"

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"By a long margin."

"Well I'll be damned. All right, then. Let's see what happens if we turn the crank again."

What he didn't expect was that the next Wyoming gubernatorial race would polarize the candidates along issues rather than party lines. It was obvious when he stopped to think about it; after four years of familiarity with the forecasting program, people weren't going to listen to promises anymore. This time the people were voting for *what* they wanted, not *who,* and trusting the program to provide the details of how the elected official achieved it.

Twenty-twenty hindsight, Brannon thought. He should have seen it happening, but he was only looking ahead these days. To his presidential campaign.

He called his party the Futurians, and he ran on a one-plank platform: Let the people decide where the country was going, and he would be the manager.

His opponents, both Democrat and Republican, tried to attack him as a man without the strength of his own convictions, willing to change his agenda at the whim of the polls, but Brannon merely ran a ten-second spot on every TV network, saying, "I admire my opponents for their honesty in stating that they won't listen to public opinion." They never recovered from that ad. Six months later he walked away with the election, and began the process of paying off America's credit card bill.

After that, with the help of Morrison's program, he put a chicken in every pot, a multimedia station in every home, and a car in every garage. An electric one, after he ordered the defense industry to declassify the electron sieve.

All the same, he had more competition for re-election. The career politicos had learned their lesson, and were espousing their own forecasting programs, which they claimed were better than Brannon's—which was why they disagreed with his over what was required to accomplish the public's stated goals. Brannon stuck by Morrison's original program, which had been continuously refined since the beginning, but he learned the hard way that public loyalty is much more fickle than the private variety. When the Republican candidate promised to eliminate taxes completely without cutting any social programs, he got nearly 80 percent of the vote.

The depression lasted only three years, thanks to an emergency session of Congress and a special election that reinstated Brannon as president. On the night of his return, he lit a bonfire on the south lawn and tossed a disk containing the Republican version of the forecasting program into the flames.

Morrison came to see him the next day in the Oval Office. Still wearing his trademark T-shirt and jeans, he slouched into one of the chairs opposite Brannon's desk and said, "I suppose you're wondering why I didn't tell you this was coming."

"The thought had crossed my mind," Brannon admitted.

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"Because we needed this depression. You got the country back in the black, but people were still basically voting themselves bread and circuses. This was the only way to convince them to take the next step."

"Excuse me? We're a trillion dollars in the hole again. Unemployment's at 30 percent. We need this like we need a nuclear war."

"That would have done it, too," Morrison said, "But I figured this was a better way."

"A better way to do what? Drive the country to its knees?"

Morrison picked at a hangnail, said idly, "You ever wonder why I picked you to give the program to? Out of all the politicians in the country?"

Brannon laughed. "I always assumed it was because I was desperate enough to listen to you."

"Right. But it wasn't just you. Remember what Wyoming's economy was like when we started this whole business? The whole state was desperate. It had to be desperate to get behind an unknown independent politician with a pipe dream. But they did it, and now Wyoming's the richest state in the union. I figure—actually the program figures—that the whole US is just about desperate enough now to do the same thing."

"We've already got a space program," Brannon reminded him.

Morrison laughed. *"That?* Satellites and planetary probes? You call that a space program? Let me show you a space program." He tugged a thick wad of paper from his hip pocket and unfolded it on Brannon's desk. The top sheet was a diagram of two cylinders side by side, each one divided lengthwise into long strips. "It's called an O'Neill colony," Morrison said. "And it's twenty miles long."

Brannon didn't see a whole lot of Morrison in the next few years. Brannon was too busy retooling the national defense industry into an orbital construction industry, and Morrison was just as busy coordinating all the private companies that would supply the colony project once the superstructure was finished.

Brannon would sometimes go outside at night and look sixty degrees to the west of the Moon, where the colony was already a naked-eye object scintillating in the perpetual sunshine of its Lagrangian orbit. He had close-up photos of it all over his office, but he preferred to look at it with his own eyes once in a while. The week they spun it up to speed he declared a national holiday and spent the entire time outside, watching through a telescope as the immense fusion engines fired long pinwheels of flame from along the dual cylinders' entire length.

Morrison showed up a couple of weeks later. His T-shirt said, "Stay Alive In L-5," and showed a wrinkled-up prune of an old woman grinning ear to ear as she threw her walker out the zero-*g* living section's airlock.

"What do you want now?" Brannon growled at him. He was becoming a crotchety old fart in his own right nowadays, and he knew that Morrison only came to him when he wanted to stir things up.

Sure enough, as he slid into a chair opposite Brannon, Morrison said,

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"The first load of colonists goes up next month. Everything's all set for them except for one little detail."

"Yeah, right," said Brannon. "What? Air? Water?"

"No, no, we've got plenty of that. Made it ourselves from Comet Goodloe. What we need now is somebody to run the place. A mayor."

Brannon snorted. "Details, details. Good grief, you forgot to install a *government?*"

Laughing, Morrison said, "We didn't forget. It just didn't seem like a high priority. After all, the job's mostly symbolic anymore. We've got voting stations in every house, and there'll be an issues channel on the multivid, so all you'd be doing is rubber-stamping whatever—"

"House?" Brannon asked. "You have houses up there? I thought it would all be apartments."

Morrison looked at him askance. "Haven't you been reading the briefings I send you?"

"Of course I have!" Brannon protested, but when Morrison started to laugh he said, "Well, most of them. I can't read everything that comes into this office, and I figured I could trust you to do your job right."

"And you think 'right' is a bunch of crackerbox apartments in a tin can? Good grief, I've built paradise right under your nose—well, OK, over it—and you haven't even paid attention." Morrison laughed again. "You like to fish, don't you?"

"When I get time," Brannon replied, wondering what Morrison was getting at now.

The answer didn't take long. "We've got four hundred miles of trout streams in either half of the colony. We've got two oceans. The salmon are already migrating in the east cylinder."

"Why not in both?" Brannon asked, figuring he'd try a subject shift of his own.

"Because it's six months out of synch, that's why. You think we want the whole colony to have the same seasons at the same time? Boring." Morrison propped his feet up on Brannon's desk. "What do you say? Our job's done here. Why don't you blow this two-bit planet and come live where the action is?"

Brannon thought about it. President of the United States wasn't exactly a chump job. But he had to admit, Morrison's forecasting program had transformed it from the old power seat to a mostly managerial position. Mayor of humanity's first space colony wouldn't be so cushy, no matter what Morrison said about it. His program couldn't predict all the failure modes of something as new as this. Humanity's first permanent step away from Earth was a step into completely unexplored territory, and there would undoubtedly be problems. Brannon knew he wasn't the most innovative thinker in the world, nor the most dynamic leader, but he figured he could do the job as well as anyone. It sounded like an interesting challenge.

And if it wasn't—well then, fishing sounded good. Maybe Morrison's program could even tell him what they were biting on. ■

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Probability Zero

Jeffery D. Kooistra

THE WORRY WART

Wilbur dragged himself to work, and to his desk, where he took out the pink stuff and swigged down a couple of swallows right from the bottle. He opened his top desk drawer and checked his supply of antacid tablets—still a couple of dozen rolls in there—that should last him most of the week. He put a couple rolls in his pocket and flipped on his computer. Now he was ready for work.

The Federal Responsibility Act of 2001 (the "Worry Wart law") had mandated that for every company in the US of A, every employee of each company had the right to know who was responsible for worrying about whatever problems they might encounter at the job site.

At General Hazardous Waste Disposal Company, that man was Wilbur.

Mondays were the worst. It seemed that half the employees would go home on Friday dedicated to thinking of something that was a problem so they could hit Wilbur with it on Monday. Of course, the federally mandated whistle-blowers prizes were quite lucrative.

Sure enough, as his monitor started to glow, Wilbur saw he already had three concerns waiting for him. He noted where, nervously swiped his pocket to confirm that the antacid rolls were there, then went out the door.

His first stop was to see Mike in shipping and receiving. Mike had been around for years, and seldom had any concerns. As an old hand, he remembered the days when employees would take some initiative in worrying about their own problems. Not like a lot of the newer guys, of whom there were always plenty. GenHazCo had a rather high turnover rate—lots of

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their hirees seemed to get sick a lot.

"What's the problem, Mike?" Wilbur asked as he hit the loading dock.

"It's the pallet jack, Wilbur. See, the wheel is coming loose. I can still use it, but I'm afraid one of these days it will come off and I'll spill a barrel or something." Wilbur looked at the wheel, made a note on his pad, and said, "Thanks for bringing this to my attention. It's not your worry anymore—it's mine."

Wilbur's next stop was in the information services department. "OK, Stu, what can I do for you?"

"Oh, hello, Wilbur. Glad you came so early. We discovered recently that there's a glitch in our tracking software. This weekend we found out a load of barium went to the old landfill and a barrel of outdated shampoo went to the hazardous waste containment site."

"Boy, that's a humdinger, all right. Were they mad over at hazardous waste? "

"Sure were. But I told them I wasn't paid to worry about that problem."

"That's right—I am," Wilbur said. He popped a couple of antacid tablets in his mouth and jotted down another note in his book.

His final stop of the morning was over in the high-level nuclear waste stabilization section. That part of the plant was kind of neat, Wilbur thought as he walked past the rows of big, cylindrical tanks outside. He remembered when they were all shiny white. Now, most of them could use a couple of coats of paint over the rust spots.

A new man was in charge there, some Pete Switzer. Of course, there seemed always to be someone new over in the radiation section—their turnover rate was awful.

Wilbur reentered the building, turned a corner, and heard shouting.

"Look at that tank over there!" Pete was screaming at an underling. "I can see the crack in it from here," he said, pointing out the window. "I told you to drain it an hour ago!"

"But that's not my *job,"* the underling protested. "The tank drainer guys come in at ten. The union says I can't even touch those tanks out there until they're already drained."

"If that tank isn't taken care of soon, we're going to dump ten thousand gallons of high-level liquid nuclear waste right into this office!"

"I'm not paid to worry about that!" the underling said, then he spotted Wilbur standing there watching the exchange, pointed at him and said, "He is!"

Screeeeech! It was the sound of tearing metal.

"Oh my God!" a secretary screamed. *"Stuff* is pouring out of that round tank thingy over there!"

"OK!" Pete hollered at Wilbur. "So you're paid to worry about these things?"

"That's right, dammit!" Wilbur said, finally asserting himself. He'd really had enough of these new guys being such hotheads.

"So what are you going to do about *that?"* Pete asked, pointing to the tank with a torrent of raw liquid nuclear waste glowing and flowing forth, down the pavement and pooling by the window.

"Do?" Wilbur asked. ■

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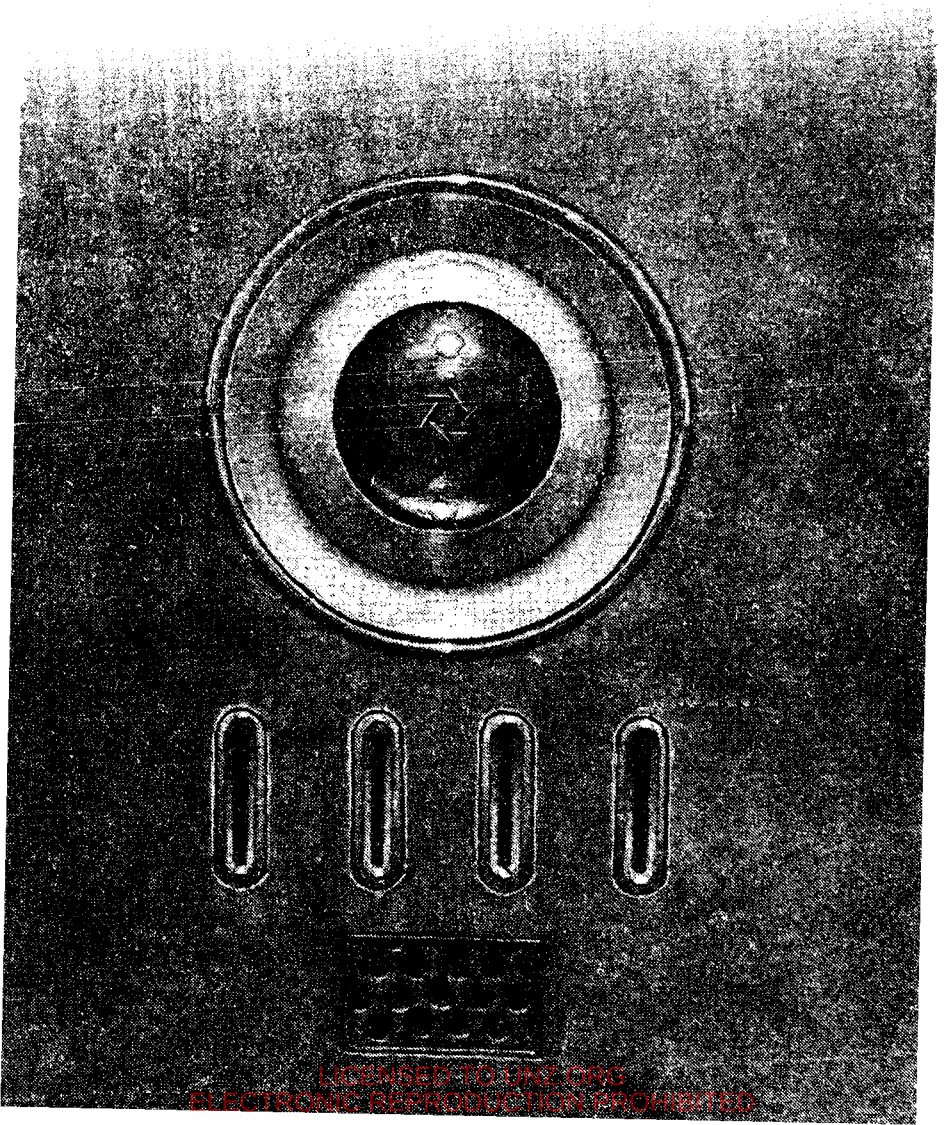

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Walter F. Cuirle

Billy's Bunter

Some forms of oppression are subtler than the obvious. So are some ways of fighting back. . . .

Illustration by Darryl Elliott

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It was warm in the back of the third-grade classroom, hot in the glare of the Sun through the windows and starting to get muggy and smell like bored kids.

Miss Barstow kept droning on about something or other up at the front of the room. Billy's attention wandered with his gaze, through the windows and out to the playing fields, crisp and green in the afternoon Sun. He could feel its warmth on his back, there at the plate.

"William! How would you arrive at the answer?"

Billy's attention snapped back to the front of the room. Maybe she meant Billy Farlini?

No such luck. She was looking right at him. All that was on the board was "3 Apples" and "2 Boys" and a question mark. Stall.

"The question was, Master Phillips, how can we fairly divide three apples among two boys?"

Oops. She's using last names and "we." Trouble. Why is it that she gets to use my first name when she's feeling good about us and last names when she's not? We only ever get to use her last name. I guess that says what she wants us to think about her. Never mind. If it's three equal apples and two friendly boys, I just split one in half but she didn't say that. Split 'em all in half—but that's only three cuts so who does the cuts? One guy has the advantage. Split 'em all in quarters and that's six cuts—that's it! Like Farlini in the lunchroom.

He stood up at his desk. "Miss Barstow, I would let the first boy cut the first apple, then the second boy cut the second apple, then the first boy cut the third apple, then the second boy gets to cut the first apple again . . . "

"No, Master Phillips, that is wrong."

Snickers in the front row. Somebody made a fart noise, probably Farlini, and then a lot of kids laughed out loud. Bigger trouble; she hated it when the class got out of control. Billy felt himself blush.

She ignored the outburst. "We simply divide three apples by two boys to get one and one-half apples per boy. We give each boy one whole apple, then split the third apple in half and give one half to each. That is the correct way."

Maybe you, thought Billy, but not we. That's the simplest way, but it's not 'fairly.'

Billy swallowed his protest but not before it showed on his face. Miss Barstow's eyes narrowed for just an instant. She used her best neutral tone and said, "William, please see me after class. You may be seated."

Billy sank back down into his seat, bright red now and angry. He half heard more snickers from around the room and as Miss Barstow turned back to the board to set up another problem, he felt something *splat* land on the back of his head. Spitball. He quietly ripped a little piece of paper out of his notebook so he could wipe it off. As he did so, Farlini hissed "Yo, stoopid! Geek face!" from his spot in the last row, two seats back and one over.

The rest of the class was mercifully short. Billy was lost in his slowly cooling anger, oblivious to everything out-

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side the top of his desk. He drew a square, then an off-center line through the square, then another line at right angles to the first. He did the same thing with a circle. He drew the pair of figures again, then again, each time varying the position of the first line and the angle of the second. "Sure this will work," he thought. When he had a page full of marked-up circles and squares, he went back and started coloring in every other segment. Before he had finished, the bell rang. The classroom emptied quickly; Billy walked slowly to the front and presented himself at his teacher's desk.

"William, do you understand what happened today?

No, not really. "Yes, Miss Barstow. I got the wrong answer."

"No, William, that is not really the problem. The problem is that your answer was not just wrong, it was," she tsked, "provocative. You tried to be different so that the other students would pay attention to you. That disrupts the class. That wastes my time and the time of all of the other students and that is not fair. Do you understand?"

Not really, Miss Barstow. "I'm sorry, Miss Barstow."

"William, please take this note to your father. I expect you to go home directly and to deliver it to him now." She tore a bright yellow form off a pad on her desk, filled it in and handed it to him. He glanced at it and recognized the standard read-your-mail form:

To: *Mr. Phillips*. Please check your e-mail after *6:00 P.M. today* for a message from *Miss Barstow*. There is a matter of some concern about your child's educational progress.

He carefully folded it, pushed it in his shirt pocket, and turned to leave.

"William," she said, more softly than before.

He turned back. "Yes, Miss Barstow?"

"William, I want you to know that I am not angry with you. Really. I am a little worried. Since your mother's passing . . . "she stopped.

Billy stiffened a little. "You mean since my Mom was killed." Dad didn't like what he called beating around the bush. "She didn't pass away or pass on," he would say. "She didn't even properly die. She was killed. We can't let people pretend otherwise."

Barstow was familiar with the family's attitude but still uncomfortable with it. "Yes," she said, "since your mother was," she forced the word, "killed. I know it must be hard. I know you must feel different from the other children. But it's better to be like all of the others. Your parents picked this school for you, a traditional school, so that you could learn traditional values and discipline. Our country's most important traditional value is equality. That means everyone tries to be the same. When you try to be different, that's not equality. Do you see?"

Billy stood unmoving as she spoke, watching her as only an eight-year-old can. "Funny," he thought, "she looks a lot like Mom but doesn't talk like her at all." Knowing that some kind of response was expected, he simply nodded and said, "I'll try, Miss Barstow."

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Home was only six blocks from school—four over, two to the left, turn right and up to the front door. Navigation was automatic and as he came to the last half-block, Billy's spirits were back to normal. The day was still bright and crisp, the Sun still well up so he might be able to deliver the note and get back to the ball field. As he came to the last half-block, he started to play one his favorite private games with the frost-heaved paving squares.

The flood waters were up and the ice floes were jammed precariously between his boat and the base camp. One floe tilted this way, the next another way. They're all smooth on top, but different sizes underneath and packed together oh so delicately. Step too far to the high side or too far to the low side and the whole pack will break apart. Got to step on just the right spot so the floe goes straight down, no twisting, and I can get safe to the base camp.

Feeling perfectly balanced, effortless, Billy put one foot on just the right place on this floe, then jumped with just enough force to land at just the right place on the next. He worked his way down to the end of the block and landed on the flat new paving block at the corner. "Yaay! Base camp! Made it!" he cheered to himself and turned right on the last stretch to his home.

Up ahead he saw his brother Jim's car in the driveway. All thoughts of Arctic perils vanished in a big grin at the unexpected visit. A rocket now, he zoomed past the neighbor's house at the corner, banked tight up his own front walk, and boomed through the front door.

Dad and Jim sat in the wingbacks in the front room, deep in conversation when Billy made his entrance. They both looked up and Jim crouched just in time to catch the impact of rocket Billy in a big hug.

"Mister Bill! Mister Bill! Look out, Mister Bill!" Jim absolutely, always said that in a high squeaky voice every time he saw Billy. Billy didn't get it, not really, but he didn't care. It made him feel good and Dad always chuckled when he heard it.

"What's shakin', Mister Bill?" asked Jim. "How are you, kiddo?"

"I got up to level two on the chess thing and I finished that book and I found the place where you said I could download more and I struck out Bates and . . . what's that?"

Billy stooped to look at the thing on the coffee table. It was a rectangular box, about the size of a small book; maybe a little thicker. It had what looked like a small lens in the center of the side that was facing up and there were four unmarked jacks on the thing, lined up below the lens like bared teeth. The whole thing had a handmade but professional appearance.

"That, Mister Bill, is a failed experiment. We were just talking about it when you came in."

"What's it do?"

"It's supposed to be a kind of assistant for people at work. It remembers phone numbers, and names and when you're supposed to do things, and where you put stuff—things like that."

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"How's it work?"

"You should be able to just hang it up where it can see you and it watches and listens to what you do at work. It's supposed to figure out what's important and remember it so if you want to know somebody's phone number or address later on, you don't have to look it up. You just ask the box."

"Neat. So what's wrong with it?"

"I don't know. It starts out all right but then it seems like after a while it forgets stuff. Well, not really forgets stuff but matches things up in a weird way. We had this one on test in one guy's office for about three weeks. One day he asked it to call his mother and it called the vice president, so we pulled the plug."

"So it gets the wrong answers."

"In a nutshell."

"Huh."

Speaking of wrong answers reminded Billy of the incident with Miss Barstow and of the note. He rummaged around in his pockets until he found it and pulled it out. Dad and Jim recognized the form.

"Uh-oh, Mister Bill," said Jim in that squeaky voice. "Watch out for that steamroller!"

"Miss Barstow, again?" asked Dad and held out his hand for the paper.

"Uh-huh," said Billy and passed it over to him. Dad glanced at the form, then at his watch, and passed the note to Jim.

"We've got at least an hour yet. Let's go make dinner while you tell me about it," said Dad.

Dad and Jim moved around the kitchen with the ease of long practice. Billy sat at one end of the kitchen table and doodled squares and circles on the top with his finger as he spoke. "See, it all started at lunchtime with Billy Farlini," he said. "I had peanut butter and he had cheese and he doesn't like cheese so he threw out his cheese and then he wanted my peanut butter."

"Oh?" Dad turned from his work at the counter. "Did he steal yours?"

"No. Nothing like that. He wanted me to share, he said. That was OK with me 'cause I had other stuff anyway. So, I did this share thing, you know? Where you let one guy cut and then the other guy picks? So I let him cut and he did it way off to one side so there was a real big piece and a real little piece and then he just sort of looked at me and I knew I better take the little piece or there really would be trouble."

"So he got the big piece? Then what?" asked Dad.

"Like I said, I had other stuff so it was OK. Well, not OK but not so bad; and anyway right about then Miss Bongaro came in and sat at our table and she started talking with all the kids so Farlini got all nice the way he does when there's a teacher around. So there wasn't any trouble."

"So where does Miss Barstow come in?"

"Well, later, in class, Miss Barstow asked how to divide three apples for two guys." He drew three circles on the table with his finger. "And then I remembered Billy Farlini in the lunchroom and how cut and share didn't work and I thought, well, the problem there was that there were two guys and one cut. But if each guy got a cut and then they took turns choos-

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ing then it would be fair. You know, like if Farlini cut first and then I got to cut where I want and then he chose a piece and then I chose and like that. So I was thinking of that and I thought that's what she meant when she said 'fairly.' And then I thought, well, if there's three apples and two guys and each guy gets one cut, then that doesn't work 'cause there's an apple left over. And if each guy gets two cuts that could work except the pieces are always different sizes and you don't know if the apples are the same. But if each guy gets three cuts and it's two cuts on each apple then that should work out fair. I think."

By this time, Jim was sitting at the other end of the table doodling his own set of circles and slashes with his finger. Dad stood staring at Billy's side of the table, visualizing the boy's method.

"That's pretty sharp, Mister Bill," said Jim

"It sure is. That's a clever solution, Billy," said Dad. "So where's the note come in?"

"Well, Miss Barstow said it was wrong. She said you just cut one apple in half and give each guy a whole apple and a half apple. But I still don't get it. It's not 'fairly.'"

Jim laughed. "That's just what I ordered; it's not what I want." he said. Then Dad laughed too.

"Huh?" said Billy.

"It's OK, Mister Bill. It's a saying at my company. When somebody wants a special program or a special computer they usually go to a lot of trouble telling us exactly how they want it to work. If we give them exactly what they order, then a lot of the time they come back and tell us it's not the right thing. If we want to get it right the first time, we have to figure out what people mean, not what they say. Computers are easy. People are hard."

"But Billy, that still doesn't explain the note," said Dad.

"Yeah. See, I didn't give my answer quick enough, I guess, so maybe it sounded funny or something and then Billy Farlini made a fart noise and everybody laughed. Miss Barstow thought it was my fault, I guess, so that's why she sent the note."

"Ah," said Dad, and turned back to the food.

After dinner, the three went back to the front room. Dad looked at his watch and said, "I should go see if that message arrived," and went up the stairs. Billy went straight to the box on the table.

"Can I touch it?" he asked Jim.

Jim sat on the floor next to the table. "Sure," he said. "Better than that, you get to keep it for a while if you want. I was talking with Dad about it before you came home and we agreed that you're the best man for the next part of this project."

"Neat!" said Billy and grabbed the box. He sat down on the floor, facing his brother, and turned the box over in his hands. "What do I have to do?"

Jim smiled, "I'll get to that." He leaned over and started pointing to features on the box. "Here, I'll show you how it works. This thing is a status light, this lens is the eye, and these two little grilles up here on the corners are microphones. This grille down here is a speaker." He sat back.

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"If you're in your own room or office, you just set it on the desk or on a shelf somewhere where it can see and hear you. After a while it's supposed to learn enough about you so that it can help out."

Jim pulled a small zippered pouch from under the table and opened it. He took out a small flat box with two plugs sticking out the back, a thing that looked like a small hearing aid, and a pair of matte lapel pins with oversize studs. They all had the same handmade look as the box.

"Now these are for when you go out. You plug this in here," he fit the smaller box across the bottom of the larger one, covering two of the four jacks. "The speaker and microphones turn off and you use these instead. That way it doesn't bother anybody. Put this in your ear and these two pins are the microphones. Just pin them on your lapels or on your shirt or something and the box can still hear even if it's in a drawer or your briefcase or somewhere.

"But if it's in a drawer, then it can't see, can it?"

"Good man, Mister Bill. That's right. It can't. We can run wireless audio out to about fifty meters but video's harder. This third jack here is for the remote camera, but we don't have one yet. In fact, that's one of the things Dad's working on."

"So what's the fourth jack for?"

"Your computer. The box can watch what you're working on, remember what you put where and answer questions about it. For now, that's just a plain old cable hookup."

"Neat." He turned the box around in his hands and looked into the camera lens. "So what do you want me to do?"

"Just keep it around and let it watch and listen. Every so often I check on it to see what it learned and how it learned it."

Billy looked puzzled. "You mean you want me to teach it stuff? What do you want me to teach it?"

"Anything you want, really. You don't have to do anything special, if you don't want to. Just let it watch and listen." Jim straightened. "I'm mostly interested in what it decides to remember so I can figure out how it did it."

Billy set the box on the floor between them. "Anything? I can teach it anything at all?" Jim nodded.

Billy could see the possibilities. Phillips. Bill Phillips. Master spy. Casual, catlike, he walks down the darkened street and crouches at the alley entrance. "Keep your eye out," he whispers and sets the box down in the corner. He glides quickly to the steel door a hundred feet away. He crouches by the lock, quickly unfastens one lapel mike and holds it to the door. Gracefully, artfully, he touches a slender pick to the lock and whispers, "Tell me when it's open." But then, "Commander!" hisses the voice in his earphone, "someone's coming!" "How much time do I have . . . um . . . uh."

"Does it have a name?"

"Funny you should ask, Mister Bill. Our psych people worked out three different personalities and named them after butlers: Bunter, Lugg, and Jeeves. This one's loaded up with Bunter."

"Can I talk to him?"

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Dad started back down the stairs with a sour look.

"Sure, but I think we'll have to do that later, Mister Bill. Right now, it looks like Dad's got some news about that note." He put the equipment back on the table. "So what's the story, Dad?"

Dad sank back into one of the chairs. "About what I expected. She's on record noting Billy as a disruptive influence. That forces me to acknowledge. I'll write something back when I cool down; I don't know whether in protest or appeasement." He looked at Billy for a long moment. "Billy, this really doesn't have anything to do with you. You really didn't do anything wrong and nobody thinks you're a bad kid. Probably not even Miss Barstow. There are all kinds of things going on at your school that have nothing to do with school." He leaned forward. "Look. If you get called out again like that, the safest thing to do is just apologize. You know, 'I'm sorry, Miss Barstow. I don't understand.' Then follow her lead and let it go at that."

Jim glanced at Billy then bit his lip and looked at Dad with lowered brows. Dad ignored him. "Got any homework, Billy?"

"Yeah. Some. Not much." Dad said it wasn't a big deal but it sure felt like it was getting to be one, somehow.

"Well, you know the drill. Why don't you go on upstairs and do it, then you can talk to Jim some more later on."

"OK." Billy grabbed his bag and headed for the stairs. "Jim," he said, "don't go away. Remember, you said I could talk to, uh, what did you say the name was?"

"Bunter."

"Bunter. Right. Remember, you said I could talk to Bunter."

"We'll be right here, Mister Bill. See you later."

When Jim felt sure that Billy was in his room and could not hear, he turned to his father. "Dad," he said, "what got into you? What do you mean apologize? Mister Bill had a great solution to that problem. He just overdid it, that's all, and that Barstow woman wasn't bright enough to see it. Why don't you complain about her to her boss? What's the kid got to apologize for?"

"It's not that simple, Jim. If she really thought he was wrong or slow she would have sent an academic notice. There's no crime attached to that in the Trad schools. The worst that could happen is that Billy would get left back or wind up in remedial. She didn't do that. She specifically mentioned 'disruptive behavior.' In the Trads, that's a strike, and you never really know what the count is going to be for an out."

"So protest! The kid didn't do anything, did he?"

"I doubt it. When Billy gets bored with the reality around him, he just makes up one he likes better in his head. I can't imagine him disrupting anything, but that's not the point. She says he did and I would have to prove that he didn't."

"Guilty until proven innocent. What is this, old Russia?"

Dad shrugged. "No, it's America un-

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der the Party. That's more like England under Cromwell than Russia under Stalin. Without the cheap vodka to forget about it all."

"Come on, Dad. You sound like some kind of sixties hippie radical."

"Well, I am. Still. Mostly. But don't you go pointing fingers—who used the word 'protest'?"

"You know what I mean. She's picking on him."

"I don't think so. She either really thinks he is disruptive, by her lights, or she thinks he might become disruptive and she's just protecting herself."

"How do you figure that?"

"It's the way evaluations and pay are handled these days. Every fall, every teacher is evaluated three ways: by the lead teacher or 'principal,' by the outcome of a comprehensive exam of students from the previous year, and by the parents of the students from the previous year. It's insidious."

Jim paused. "That doesn't sound so bad. But I'm trying to think and I don't remember when that started."

"About four or five years ago, when you weren't looking. Neither was anyone else."

"Maybe I wasn't paying attention, but it just sounds like performance evaluations. What's wrong with that? I use them myself."

"Sure you do. And it makes sense for your business. Let me ask you this. Suppose you get in a bad batch of chips. One of your people catches the problem before the parts get into the system. How do you rate him?"

"Good. He's doing exactly what he's supposed to do. He gets rewarded."

"OK. Now suppose the vendor of those chips is your majority stockholder. He says put them through or lose your job."

"I would never—some of those machines are—lives depend on some of those machines. I'd sell my own stock and quit first."

"I guess you would; I raised you better than that. But just suppose. The vendor gets paid, your job's secure for a while, but you have to override the inspector. There's the tricky part. If somebody gets hurt and it becomes public, who gets the shaft? You and the vendor shut up and stick together, he fingers one of his inspectors, you finger one of yours, insurance handles a few claims and there you are."

Jim didn't take long to consider this. "But that's illegal. It's fraud. It could even be racketeering!"

"Says who? Those two inspectors? Sour grapes. They can't prove anything. Besides, if you're smart you found them nice featherbeds with some other vendor who owes you or might want you to owe him. If they want to stay in their featherbeds, all they have to say is, 'Sorry, I made a mistake.'"

"What a mind you've got, Dad. Besides, even if something like that did happen, it could only happen, at most, once. I'll take a big hit in customers after the first time and lose them all if it happens again."

"Not if you're big enough. If you're pretty much the only game in town, the customers will just shut up and start doing their own inspections. You do it yourself."

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"No, I don't."

"Sure you do. You advertise a job, and in the ad you say that it requires a diploma or degree or some kind of educational certificate. Your applicants can't get through the door without the required papers, but you give every one of them a competency test, too, don't you?"

"I do. The law says that if I want to test one, I have to test all."

"Why? Why test anybody? It costs you, doesn't it? I mean, they've all got the certificates you asked for; aren't those papers worth anything?"

Jim paused. "You get the point, Dad, but I don't concede the game. Not yet. Anyway, what's this got to do with Barstow and Billy?"

"Let's just say Barstow's the inspector and Farlini's a bad chip." Dad waited.

Jim didn't bite. "Go on, old man. I know you set me up but I don't feel like giving you the satisfaction."

"There are loopholes in the exam evaluations. If a student does poorly, the parents can claim that his learning was affected by some disruptive influence. From what I hear, Farlini used exactly that argument last year. They don't really have to prove anything. The principal evaluates the complaint using the teacher's records—like that note I got. Last year, Bongaro was forced to shill for the Farlinis. She fingered the Mathews kid, he got tossed to an Open school, and Farlini passed. This year it's my turn in the barrel."

"Why you?"

"It's a Trad school, a private nonprofit in the public network. Public vouchers don't cover expenses, but regulations prevent surcharges. So, donations are gratefully accepted to the endowment, the general fund, etcetera and so forth. Farlini's a big giver. I'm not, not that big. Neither was Mathews."

"Come on, Dad, if it's just money I can help out. Gladly. You know that."

"I do, and I thank you. But I don't need your money. I don't want it. This is a matter of principle."

Jim made a face. "If it's such a matter of high principle, Dad, then why are you telling Billy to apologize to Barstow?"

Dad was silent. After a time he said, "I guess because it's my principles getting hammered, but, on the other hand, Kathy really wanted Billy in this school."

It was Jim's turn to be silent. At last he said gently, "Kathy's dead, Dad."

Dad looked suddenly old. "I know. Two years this coming Saturday, at 3:11 in the afternoon." He looked at his older son and said, "I still miss her, you know," as if apologizing for something.

Jim sighed. "I miss her, too, Dad." They sat in silence a moment longer, then Dad took a deep breath and smiled. "Come on, let's see what Billy's up to," he said.

They both rose, then Jim turned to the table. "Wait a sec. Let me grab this stuff. I promised Billy he could talk to Bunter." He swept the cables and parts back into the zipper bag, grabbed it and the box and headed for the stairs.

Billy's second-floor room was as traditional and old-fashioned as his

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school, or for that matter his father. Bed, desk, and computer were plain and functional surrounding a single window that looked out on the back yard. All the free wall space was taken up with built-in shelves. The set of shelves in one corner held several dozen books, many from Jim's own childhood, the rest was occupied with kid litter typical for an eight-year-old. Billy sat at the computer assembling some kind of puzzle with pieces that giggled and moved around whenever he tried to fit one.

"Homework all done?" asked Dad.

"Yep," said Billy, pointing to a battered folder on his desk labeled "Homework" without turning from his game.

"Let me check," said Dad, took the folder and sat on the bed. Jim came in with Bunter and his accessories and Billy turned.

"Hey, Jim, great! You brought Bunter. Can I talk to him now?"

"Dad?" asked Jim. "Do you have everything you need for those tests you were going to run for me?"

"Hm?" Dad looked up from the folder. "Let me think—cleared prototype, a dump of this one and a backup . . . are you going to reset this one to clear?"

"Pretty much have to, Dad. You don't need Billy running around with George's phone book."

"I don't know. We might learn something. Tell you what—why don't you give me another image dump of this one just after you clear it. I might want to compare initial conditions before we start training it. They should be the same, but you never know."

"Will do," said Jim. He turned the box over and snapped back a small cover to reveal a connector. "Hand me that case, would you, Mister Bill?"

Billy handed over the zippered case. Jim drew out a thing that looked like an old-fashioned hand calculator with a cable at one end and plugged the cable onto the connector in the back of the box. He looked around the room. "Got any blanks, Mister Bill?"

"What for?" Billy asked.

"I want to make extra dumps to be sure we have what we need for Dad's tests. Then I need to erase everything he learned with George so he can start to learn fresh with you."

Billy went over to a shelf and got down a fresh box of disks. "Why?" he asked as he handed the box to his brother.

"Why what?"

"Why make him forget everything he's learned already? Won't he just have to learn it all over again? And anyway, if he remembered the old stuff, wouldn't that make it easier to learn new stuff? I mean, I have to remember most of the stuff from second grade to be in third grade."

Jim looked at Billy speculatively. "You know, Mister Bill, I think you'd be right if Bunter was working the way I meant him to work; but he's not. The stuff he's already learned is kind of mixed up, so we're going to erase it all and start over."

"So you have to erase him because he made too many mistakes."

"I guess that's one way to put it."

Billy thought about this while Jim opened the box popped a fresh disk into a slot on the side of the diagnos-

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tic unit. "If I could forget that I got stuff wrong, would I stop getting it wrong too? I mean, like with Miss Barstow today."

Jim shook his head and looked at his brother. "Billy, you weren't wrong at all; if anything, you were a little too right. Don't worry about it. What Dad said is true. That trouble with Miss Barstow really doesn't have anything to do with you or math problems." He turned back to the job at hand.

"OK. First we make a copy of him the way he is now." He pressed a few keys on the control panel and the drive whirred.

Billy watched in silence. "Is Bunter going to remember how to talk?"

"As soon as I'm done here, I'll remind him how to talk to me. We'll have to teach him how to talk to you."

"How?"

"All you have to do is read to him." Jim exchanged the disks one last time.

"What do I read?"

"Pretty much anything you want."

Jim removed the disk, labeled it and set it aside. "Now we erase." He entered some more keystrokes on the pad. "And now we take another image." He popped another blank into the drive and entered still more commands. Once again the drive whirred. When it stopped he popped out that disk, labeled it and set it with the other. "And finally, we remind him what my voice sounds like." he said. He reached back into the pouch, pulled out an already labeled disk, put it in the drive and set it to work.

"Why does Bunter need to know what your voice sounds like?"

"He doesn't really have to, but it will make it easier to teach him your voice."

"Why? I don't think we sound the same."

"We don't. You'll see." He removed the disk and put it away.

"All right. All done. Here you go, Dad." Jim handed over the two disks he had made.

Dad had finished with Billy's homework folder and was standing by the window, staring out at the backyard. When Jim spoke, he turned with a distracted look.

"All set?" he asked.

"Uh-huh," said Billy. "Jim says I get to read to Bunter. Anything I want."

"Sounds like fun. Why don't you get washed up and ready for bed. Then you can read to Bunter as long as you want. Your homework's fine." Dad gestured at the folder on Billy's desk.

"OK." Billy grabbed his pajamas off the bed headed down the hall to the bathroom.

Once again, Jim waited until Billy was out of earshot. "Something's eating you, Dad," he said.

"There is. I can't help but think that there's more going on at that school than meets the eye. I'm going to head over there tomorrow afternoon and talk to Barstow. She had a spot open on her schedule."

"What do you hope to find out?"

"From her, probably not much. But maybe I can get a hint about what the dog was up to in the nighttime," said Dad.

Lieutenant Commander William Phillips stripped and stepped into the decontamination chamber of his base

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camp. It had been a hard day. That close encounter with an alien monster had taken a lot out of him and he welcomed the warmth of the shower. He scrubbed thoroughly, top to bottom. Miss a spot and you risked getting the scrunge, as the crew called it, a smelly green slime that hardened to an emerald casing if you gave it half a chance. Finished with his skin, he stepped out of the chamber and activated his ultrasonic degermer at station two. Scrunge was even nastier if you let it get hold in the mouth. He looked forward to a relaxing evening in his fatigues curled up with a tech manual on advanced robotics operations. He'd earned it.

Jim was still sitting on the bed when Billy came back into his room. Billy joined him. "Mister Bill! You're looking scrunge free," said Jim. "Oh, look. Here's something I forgot to show you." He turned the box face down on his lap. The test unit and cable were still attached. "See this other little cover?" He pointed to the opposite corner. "That's the power connector. Go ahead, open it."

Billy tried to pry up the little plastic cover with his finger, tentatively at first then with a little more force until it popped open. Jim handed Billy a long cord. "Now just plug the one end in here and the other end in the wall. Six hours will charge him up for two days, but it's best if you just get in the habit of plugging him in every night before you go to sleep. Got that?"

"Got it. Even Bunter's got to eat." Billy flopped over the side of the bed to put the plug in a wall outlet, then levered himself back up. "*Now* can I read to him?"

"Sure. Here, get settled in. I have to set Bunter up so he can look over your shoulder." Jim had the box with cable and control pad attached in one hand. As Billy settled in, Jim looked at the shelves overhead, set the box on the lowest one and frowned.

"I don't think this is going to work for text scanning." Jim mumbled as he moved the box from place to place. "You know, Dad, I could really use that remote camera."

"I've got enough stuff in the Dungeon I could probably whip up something on a cable in a few days," said Dad, "but we're still a good month away from a remote. Why don't you just pick a spot and ask it if it can see?"

Jim snorted. "Duh. Guess that's why we pay you the big bucks." He looked at his brother. "Mister Bill, what do you want to be the first thing you read to Bunter?"

"Tik-Tok." said Billy with assurance. The Lt. Commander had already decided on robot operations for the evening.

"I'll get it." Dad smiled as he turned to the bookshelves. The Oz books. Fifty-some hardbound library editions, all safe in plastic covers. None of them were first editions except for a couple of Snow's last ones, although even the latest were almost fifty years old for all that. He ran his hand over the spines. Most of them he had acquired as gifts, the rest he had bought himself; ten he remembered he had bartered for with another kid, although just what he had traded for them was long forgotten. Those were

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the only ones that had the "This book belongs to" box filled in; in ink, damn it. Old and well-thumbed friends, they were the first world he remembered exploring entirely on his own, again and again. There had been a time when he could construct a map from memory. Jim had gone from learning to read to loving it by the same route, and now on to a third generation.

He pulled down *Tik-Tok of Oz,* opened the front cover, and scanned the blurb on the dust jacket beneath the protective plastic. Polychrome, Shaggy Man, Betsy Bobbin. Price—$2.50. Huh. The Trad schools though they had a lock on tradition, but the library at Billy's school only had the first five books or so, and those in paperback. He'd checked. Still, it was better than nothing. Better than the Community Standards schools; they had deliberately banned the books. Can't have witches and fairies. Can't allow sweet, ditsy Polychrome, daughter of the rainbow, to compete with Genesis. Far better to tell kids that the rainbow is a promise from a cranky All-Father that he won't swing the strap quite so hard the next time. What would they make of the Heinlein, Farmer, and Maguire adult editions he had on his own shelves? Enough. Leave it for tomorrow.

He closed the book and handed it over to his youngest son. "Here you go, Billy."

"Thanks, Dad," he said. "What do I do now, Jim?"

"Just open the book on your lap and get ready to read like normal."

"Don't I have to put on the pin mikes or the earplug?"

"Not this time. I need to hear what Bunter is saying and you're plenty close enough that you don't need the pins."

Billy pulled up his knees and placed the book on them. He opened it and slowly paged through the front matter, studying Neil's lovingly detailed art deco pen-and-ink work. He came to the first page of text, opposite a drawing of Tik-Tok on a mule. "Ready," he said.

"Now here's how it works, Mister Bill. I'm going to talk to Bunter first and you have to be quiet while I do. I'll introduce you, sort of, and then you can read to him. By the way, what do want Bunter to call you?"

"What do you mean?"

"When you want Bunter to talk to you, you just say 'Bunter' and then he'll say 'Yes' and your name so you know he heard you. The name can be anything."

"What do you use?"

Jim looked a little embarrassed. "I, uh, have him call me 'Mister Phillips' just because he's based on a butler and sort of sounds like one."

Billy thought a moment. Jim had Mister Phillips and Miss Barstow used Master Phillips so forget that. She used William, too. Mister Bill was Jim's nickname for him, so that wouldn't sound right. What would? "Master Bill, Scotland Yard on the telephone for you, sir." Yes.

"Bunter may call me Master Bill," said Billy.

"All right." Jim smiled. "Sounds like you want the full English butler treatment. You can change Bunter's name now, too, to anything you want."

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"No thank you. 'Bunter' is acceptable," said Billy, still in character.

Jim smiled. "Fine. Now here's the drill. When you want Bunter to talk with you or answer a question, just say 'Bunter' and wait for him to say, 'Yes, Master Bill.' Then you can just talk and he'll talk with you. When you're done say 'Thank you, Bunter,' or 'That will be all, Bunter,' Wait for him to say 'You are welcome, Master Bill,' or 'Thank you, Master Bill,' and he'll go back to just watching and listening. He won't say anything until you call him again. Got that?"

"Yes, Mister Phillips. Thank you, Mister Phillips," intoned Billy.

"You are welcome, Master Bill," responded Jim in the same tone. Staying with the game, he kept silent while he placed the box on top of a pillow to the right of Billy's head. He kept the control pad on its cable in his left hand. Looking at Billy, he held his finger to his lips for silence and pushed a key. The pinhead light on the box turned green.

"Bunter?" said Jim.

"Yes, Mister Phillips," came a voice from the box. It had a decided but pleasant accent and sounded like a male baritone on a speakerphone.

Jim spoke clearly and slowly. "Rumplestiltskin. Control append. Control name: 'Master Bill.' Unit ID: 'Bunter.' Default passive. Passive to active: unit ID. Active to passive: 'Thank you, Bunter,' acknowledge 'You are welcome,' append control name. Or: Active to passive: 'That will be all, Bunter' acknowledge 'Thank you,' append control name. Verify. Rumplestiltskin."

The light turned red for a moment, then green again.

"My name is Bunter," said the box. "I serve Mister Phillips and Master Bill. I will watch and listen always but I will not speak unless spoken to by one of them. Either of them may summon me by my name. If I am dismissed with the phrase 'Thank you, Bunter,' I will acknowledge with 'You are welcome, Mister Phillips' or 'You are welcome, Master Bill' as appropriate to the speaker. If I am dismissed with the phrase 'That will be all, Bunter,' I will acknowledge with 'Thank you, Mister Phillips,' or 'Thank you, Master Bill,' as appropriate to the speaker. Is this correct?"

"That is correct, Bunter. Thank you, Bunter," said Jim.

"You are welcome, Mister Phillips," said the box.

Jim pushed another key and the light turned yellow.

"OK, Mister Bill. Now he knows who you are, but he doesn't know what you sound like. Now I'm going to introduce you. Just answer his questions."

Jim pressed a key and the light turned green again. "Bunter," he said.

"Yes, Mister Phillips."

"Rumplestiltskin. Voice recognition training. Mode transfer sequences for control name 'Master Bill.' Rumplestiltskin."

"Hello, Master Bill," said the box. Billy's face lit up. Jim grinned at him and held up a hand. "Please say 'Bunter,'" said the box.

"Bunter," said Billy. The light flickered green to red and back again.

"Please say, 'Thank you,'" said the box.

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"Thank you," said Billy. The light flickered again.

"Please say, 'That will be all,'" said the box.

It continued on in this vein for a few minutes, bits and pieces of phrases asked for and supplied several times in no obvious order. It went on long enough for Billy's excitement to wear off and he was starting to fidget when the box said, "Complete. Thank you, Master Bill," and went silent. The light stayed green.

"That will be all, Bunter," said Jim.

"Thank you, Mister Phillips," said the box.

Jim disconnected the cable and keypad from the box and snapped the cover back into place over the port. "Now can I start reading?" asked Billy. He was growing impatient with all the preparations.

"Almost, Mister Bill. Introductions are over, now I just want to make sure that it can see the book."

"Wait a minute. Why do I have to read to him, anyway? I mean, if I have to read to him so he can learn my voice then how can he know what anybody else is saying unless they read to him, too? And if they don't have to read to him, why can't he learn my voice that way, whatever it is?"

"You're right. It doesn't take very long for him to learn a voice," said Jim. "All he really needs to do is hear a voice he knows already talk with a voice he doesn't know for a little while.

"It's different for you, though, because you're going to be a control name. He's not just going to pick out facts from what you say, he's going to try to understand what you mean. He's going to talk to you, too, so we have to give him the right vocabulary. Reading to him is the easiest way to do those things. There are other ways, but they're way boring, believe me. Besides, only a recognized control voice can program him."

"Oh. That's what Rumplestiltskin is about, isn't it?"

"You got it," said Jim. "Set that book up on your knees again."

Billy settled himself again and Jim adjusted the box on the pillow. "Try to hold still for the first few pages," he said. "That should be enough so that if he falls down after that, you can just ask him if he can see the book."

"Bunter."

"Yes, Mister Phillips."

"Can you see the book?"

"Yes, I can, Mister Phillips."

"Can you see the text on both pages?"

There was a slight hesitation. "I see no text on the left-hand page," said the box.

Jim reached to adjust the box, then noticed the book. There was, in fact, no text on the left-hand page; it was filled with an illustration. With a puff of exasperation, he said, "I'm sorry, Bunter. You're correct. There is no text on the left-hand page. My mistake."

"Quite all right, Mister Phillips."

Jim turned the page. "Now can you see the text on both pages?" he asked.

"Yes, I can, Mister Phillips," said the box without hesitation this time.

"Can you read all of it?"

Another hesitation, then, "Yes, I can, Mister Phillips."

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"Thank you, Bunter."

"You're welcome, Mister Phillips."

Jim turned back to the first page. "We're ready to roll, Mister Bill," he said. "I'll tell him what we're up to, then all you do is say 'Bunter' and start reading right away. It'll help if you point to the words as you go along, you know, just the way Dad taught us to read. That's really what you're doing, after all."

Maybe Dad alone had taught Jim to read, Billy didn't know, but Mom had taught Billy as much as Dad had, maybe more. He thought he remembered her reading this very book to him for the first time, her finger tracing out the words as she went along, but he wasn't sure. He felt a moment's longing at the memory.

"Bunter," said Jim.

"Yes, Mister Phillips."

"Master Bill is going to read to you."

"Very good, Mister Phillips."

"Thank you, Bunter."

"You are welcome, Mister Phillips."

Jim nodded to Billy. "Bunter," said Billy.

"Yes, Master Bill."

"Chapter One. Ann's Army." His finger underlined the words one by one as he read, "'I won't!' cried Ann; 'I won't sweep the floor. It is beneath my dignity. . . .'"

Jim gave Billy a thumbs-up and Dad gave him a wave as they silently left the room.

The next afternoon, Jack Phillips signed in with the security guard at the visitor's entrance of Billy's school, quickly going through the scanner, ID check and appointment verification.

"You're about fifteen minutes early, Mister Phillips," said the guard. "You can wait right over there, if you like."

"Thanks," said Jack. He looked at the three molded plastic chairs opposite the guard station and decided he would rather not. "Mind if I look around a little bit?"

"No problem, just please stay on this floor until the kids let out. Miss Barstow is up in Room 210, second floor to your left off the stairs."

"OK. Thanks again."

Jack pushed through the inner glass door to the main foyer, a large open area set in the corner of the square building. Before him, a broad staircase led to the upper floors and the working area of the school. To the left of the staircase a long corridor formed a wing of administrative offices and support space: counselor's offices, faculty lounge, copy room, computing services; uniform little signs stuck out over each door, marking off alternate sides to end in a large wooden door with a brass plaque that read "Principal."

To the right, the entrance to a similar wing was blocked by glass double doors marked "Library" in plain, black lettering. A bust of Benjamin Franklin stood beside the doors. From out here, the library looked large and inviting, comfortable, a place for exploration. In Jack's opinion the appearance was deceiving. He found it pretty thoroughly sanitized with little to offer anyone over the average intellect or the age of thirteen. That wouldn't be so bad—it was an elementary school library after all—if there were still functioning public li-

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braries. Jack stared at the bust of the father of the public library. "What do we have, Mr. Franklin?" he echoed the question that Franklin was asked at the signing of the Constitution, "A Republic or a Monarchy?" "A Republic, sir, if you can keep it," Franklin had replied. Hah. What do you think now, Ben? What do we have now?

Shake it off, Jack, he told himself. Barstow's not the enemy, she's as trapped as you are. More so. This school isn't really the problem either. Don't go getting your knickers in a political twist. Be nice.

He heard bells ring on the upper floors, actually a recording of a traditional school hand bell. He remembered jumping a foot in his seat every time those old electric bells went off when he was a kid, and he smiled. This wasn't nearly as bad and it polishes that old traditional image, too.

He heard a kid-wave form on the upper floors and moved aside to the wall of the foyer as it started to rush down the stairs. Although he had no need to speak to Billy, and no intention of pulling him away from his friends, Jack couldn't help scanning the identically dressed figures for his son.

They grow up so fast, he thought. When they're in bunches like this, you can actually see the one-year difference from class to class. The six-year-olds, first graders, herded together by teachers behind and beside them so they won't get trampled, most of them double-footing the broad stairs, some holding onto the rail or each other. Second graders, visibly taller, taking the stairs with more assurance but still moving as a class unit. Third graders, Billy's age, broken up already into little groups of six and seven kids, cliques formed by gender and interest and genetic programming. Eighth graders, in twos and threes with the more than occasional loner. That boy, there, with the rolling eyes, the self-conscious posture and the fresh-from-the-dermatologist look. Poor kid. That incomprehensible circus has started in your pants, hasn't it? Ten is a good age. Thirty is a good age, too. Those in-between years, though . . . hang in there, kid. Most of us make it through, one way or another.

"Dad!" Jack felt a little embarrassed that Billy had found him first. "What are you doing here?"

"Hi, Billy." Jack looked down at his son. "I need to see Miss Barstow, remember?"

"Oh." A cloud passed over the boy's face. Without looking up, Jack noticed five other boys fidgeting at the periphery, watching this interaction. He smiled for their benefit.

"Going out to play some ball?" he asked.

"If that's all right," said Billy, remembering the previous day's restraint by Miss Barstow.

"Sure. I'll see you at home, then."

"See you!" And he was off, problem forgotten, back to his little pack.

The stairs cleared and Jack started up them to Room 210.

Two corridors led off the second-floor landing, mirroring the arrangement on the floor below. Jack turned left and paused for a moment. For all that the design of this building was a hundred years old, and the building might be pushing that age as well, he

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had to admit it was well maintained. The wood was unpainted, properly finished and there was a lot of it; the floors were some modern facsimile of linoleum squares and they gleamed without cracks or buckles; the windows were modern designs but fit the overall style. It made sense. This granite pile had been built as a school who-knew-when and would always look like what it was no matter how you tried to renovate the inside. Probably cost as much to demolish as to replace, he thought, looking at the deep window wells. Might as well make what you can't change the strongest selling point. A traditional school, indeed.

He started down the corridor and rapped lightly on the "210" gold-leafed onto the glass pane of an oak door. A young woman opened the door.

"Mister Phillips?" He nodded. "I'm Miss Barstow. It's a pleasure to meet you. Please come in." She stood behind the door as he passed through.

Young, he thought, very young. Probably younger than Jim. Barstow stood smiling up at him, a full head shorter than he. She had shoulder-length blonde hair held back with a plain cloth band, clear brown eyes, a build that had gone past trim to thin but was in no danger of being emaciated. She wore the standard teacher's uniform of a loose long-sleeved white blouse, floppy big bow tie under the Peter Pan collar, ankle-length blue skirt and what he only knew as "sensible" shoes—those black lace-up things with thick low heels. She could have been one of the school's own eighth-graders playing dress up, or a nun without a wimple.

You silly old fart, he said to himself. Jim's old enough to run his own company—you work for him, remember?—and nuns don't wear wimples anymore, haven't for years. Decades. Besides, see the wedding ring?

Unwilling to lose an argument even with himself, he compromised. OK, he thought, not a nun. A postulant without a cross. And with a silly clown bow tie.

"Welcome to Franklin Traditional School, Mister Phillips," she said as if this wasn't Billy's third year here. "What can I do for you?" She closed the door and seated them at two straight-backed wooden chairs beside the desk at the front of the room.

He had thought out his approach carefully. Remember, Jack, you can't prove anything and she's not the enemy. "Miss Barstow, I received your message, you know that, and I scheduled this appointment to see what I can do about Billy's behavior. Whatever it is you're doing for him here, I want to support you." Some tension in her that he hadn't noticed before seemed to be eased by his words. So far, so good.

"Thank you, Mister Phillips." She paused, choosing words carefully. "Understand that I am not, yet, of the opinion that Billy's disruptions are intentional," she said slowly. "The disturbances always take the form of making the other children laugh. He doesn't seem to be actively creating these incidents; if he began to do that, it would be quite serious. Rather, he seems to take advantage of ordinary academic situations and uses them on a whim."

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"Are you saying that the problem is an academic one, then? That his work is so out of the norm that it disturbs the others and makes them laugh?" If we put this on an academic footing, I've got a chance of getting Billy out from under this, he thought.

"I thought that was the case, at first, but I'm not so sure now. Take yesterday's incident, for example. Did Billy tell you about it?"

"Yes, he did. Divide three apples among two boys, wasn't it?"

"Yes. It was a very simple example in fractions. When I called on him, he created an answer that was so bizarre that it made the others laugh and disrupted the class. I believe that was intentional on his part."

Could it really be that simple, thought Jack. Could she just be so rigid that she didn't see how Billy was thinking? She certainly sounded rigid, with her formal way of talking.

"Why do you think he would do that intentionally?"

"'Why,' Mister Phillips? I'm not sure why. It was obvious to me that he had not been paying attention to the lesson at the time. Perhaps he wanted to deflect my attention from that, perhaps he wanted to draw the attention of the other children, I don't know. I do know that he made up a silly answer and the end result was that he disrupted the class."

Eight-year-olds don't plan these things out, he thought. No matter. The decisions are based on actions and results, not intentions. She insists the action was Billy's and the result was disruption. Work with it, Jack. You can't fight it.

"What can I do to help?" he asked.

"Billy's homework is always perfect," she said, "your influence is clear there. It's early in the year yet, but I have no fears about his test scores either. Watch how he acts with others his age. See if he goes out of his way to become the center of attention. If you see that, point it out to him. I'll try to do the same here. Maybe that will help."

For some reason you don't sound at all hopeful, thought Phillips. "Center of attention" indeed. He's eight years old; you are the center of the whole universe at that age. He stifled an urge to say, *just wait until you have children of your own,* and chalked her observation up to her own youth. Still, there was something going on here that puzzled him. He wouldn't find the answer here, not today.

"Thank you. I'll do that. Would it be useful, do you think, if we got together again in, say, two weeks?"

She seemed surprised at that, then smiled. Pretty. "Of course, Mister Phillips. I'd welcome that." She rose; he did as well. "Just book it into my schedule at your convenience."

She led him to the door, opened it, then held out her hand. "Thank you for stopping by, Mister Phillips. I sincerely hope we can do something about this."

"Thank you for your time, Miss Barstow." He shook her hand briefly, hiding his bewilderment behind his best social smile, and left the room. This woman is utterly sincere, he thought, and completely convinced that Billy presented a potentially serious problem. Maybe Jim was right.

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Maybe I am just paranoid.

He was halfway down the stairs when a voice called from the landing. "Jack Phillips, you old coot. I haven't seen you for ages."

Jack turned, looked up the stairs and grinned. "Sue Waters. It's good to see you. And it can't possibly have been more than a century." She had been Billy's first-grade teacher; more than that, an old friend to him and Kathy. He felt a little guilty that he hadn't stayed in touch.

He waited while she came down the stairs to join him. She and Jack were about the same age. If Barstow looked like a postulant, Waters looked like a mother superior in full sail. The teacher's uniform completely suited her bearing.

"What are you doing here, Jack? Sneaking books into the library?"

"There's an idea. No, I had an interview with Miss Barstow, Billy's new teacher."

"Ah." She dropped the subject abruptly. "Come on, I'll let you buy me a cup of coffee to make up for your neglect. Here. You can carry my books."

Jack signed out with the guard, Waters swiped her ID through the employee station, and they were out the door and headed for the deli two blocks up the street. She kept the subjects to inconsequential catch-up as they walked.

They ordered at the counter, cheesecake and coffee, and she led the way to the rearmost booth where she took the bench facing the door. "OK, Jack. Something's eating you; I can see it in your face. Spill it."

He told the story in a low voice. He included the analogy of the bad chips and the inspector, his suspicions of Farlini, and his bafflement at Barstow's sincerity.

"Farlini, eh?" she said when he was finished. "Now there's a bad one. 'Farlini's Far Flung Enterprises.' His humble name for his little empire, 'Triple-F E.' I pronounce it 'FEH.' High-priced *tchatchkes* as tasteful as the name. His business is one thing, Jack, but I agree with you that personally the guy's got some kind of problem. I wouldn't be surprised if Junior did turn out to be the same kind of sociopath, but I haven't heard of him pulling the wings off of flies. Not yet. You might well be right about the donations, but you're just dead wrong about Barstow being bought."

Jack played with his cheesecake, uncertain where to start. "OK, Sue. I guess I'm thick. Run them by me one at a time, slowly. How am I right about the donations?"

"I said maybe. Farlini is certainly the kind of guy that would like the attention that big donations can buy and he's got the kind of mind that would assume that he's buying influence with them. He's not stupid, though. In his circles, large single donations aren't done unless there's no possible question of quid pro quo."

"What circles are those?"

"Two circles, really: Party and church. They go together. Now Farlini, he's a neo-fundamentalist, not a crypto-fundo. His allegiance to the Party is based on self-interest. It's solid and it's real. His allegiance to the church, well,

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that's just something he has to do to stay in good with the Party.

"You'll see political donations to the exact legal limit in his name, but no more. The Party won't allow it because it exposes the candidate; on the other hand, he'll give to every candidate for the Party influence it buys.

"His donations to the church are probably up to the tithe, but no more. Money past tithe doesn't buy much extra church influence—crypto rules say it's prideful—so there's no return for him there. He's into the church thing for the sake of the Party, not the other way around. Big named gifts to outfits like the ACLJ buy him recognition in both Party and church without so much risk, so he probably ponies up to the same level as the rest of the boys at the country club.

"But the school? The unwritten crypto rules say school gifts should be a third of tithe. He'd follow that. Corporate endowments are allowed, sure, but at bottom we're a charter school—private administration with public regulation. He can go anonymous or corporate on the printed annual report but he's still going to be listed as the donor on the report to the State and that could embarrass the Party someday. He'd never do that. Understand, it's not law that stops him. It's the crypto rules against the appearance of individual influence peddling."

Jack snorted. "Influence peddling? It's an elementary school, for Pete's sake!"

"Hey. It's your theory, not mine. I'm just telling you what the parameters are."

Jack shrugged at her comment. "If he's so worried about what the cryptos think, why does he have his kid in a Trad school? What not just put Junior in a Community Standards school?"

"Because he's neo, not crypto." She could see from his face that this didn't answer anything, so she went on. "Think of one of the new Islamic states. The cryptos are the crazies that run the country. The neos are the rich families that fund it, sitting behind their compound walls with satellite dishes and whiskey. They despise each other but they need each other, too.

"The crypto and neo-fundos are the same way. Cryptos tolerate the neos because they fund the movement and will toe the Party line the cryptos set, but they think the neos are hypocrites. Similarly, the neos think the cryptos are fanatics, but as long as the cryptos let them keep their compounds, so long as all the cryptos ask for is money and votes, then the neos will stay loyal.

"Farlini Junior is only nine. If he went to a CS school, they'd have him singing hosannas in six months and reporting on Bill Senior's home life in a year. Farlini doesn't care whether his kid learns Creationism or spontaneous generation in school—it has nothing to do with *tchatchkes*—but he doesn't want a true believer under his roof any more than those rich Islamic families do. That's why they send their kids to Swiss boarding schools. The way Farlini sees it, a Trad school gets Junior into the right high school and college, an Open won't and a CS is personally too dangerous. So Junior stays at Franklin."

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"Why Billy?"

"I don't know. It could just be random. You *are* right about the disruptive influence angle, but it's not really a loophole. It does have a legitimate purpose and it evolved out of court decisions over many years. It's not going to go away. Of course, that's not to say that it couldn't be exploited the way you suspect it is. It would be a clever form of insurance for Junior."

"So maybe Barstow *is* on the take."

"No, Jack," she shook her head and looked at him solemnly. "Coming from anyone else, in fact, that comment of yours would earn them a slap. I just don't think it's possible. Look, she's new, she's naive, but she's a teacher. That's not a job you just happen to take because nothing else is available, especially not at this level of education. It's a vocation. New teachers are all idealists and cockeyed optimists. You can wear them down, burn them out, and piss them off but it's hard to make them quit. You can turn them into cynics and sour their dispositions, even towards their students. But you really can't corrupt them, certainly not with money, not the way you think or for the purpose you suspect."

"You sound very sure of yourself."

"I am. Besides, I know the woman. This is her third year with us and I'm on her evaluation team, so I know her work, too. She's very reserved, kind of formal, but she's got the gift."

Waters played with her coffee a moment, then said, "You know, Jack, it could be as simple as she believes what she's saying."

"What, you're saying Billy really is disruptive?" He squirmed and glared at her.

She ignored the display. "By her lights, yes. Look, Jack, don't get upset. I don't believe that Billy is disruptive in any sense that you or I understand it, but Barstow and Bongaro—a lot of the staff—they're a different generation. They're twenty years younger than us. They think differently."

"So she only thinks Billy's got a problem. This is supposed to make me feel better?"

"Ease up, Jack. You know the old saying, 'What people believe to be true is true in its effect'? That's the situation here. People in her generation believe in their bones that something's out to get them, that violence is just under the surface. We've got detector arches and ID checks and security guards at the school and in my, what, fifteen years there, there has never been an incident. Not one. You and I would say they're not needed. She and her generation would say that nothing happened because the guards and security are there."

"'Why are you snapping your fingers,' eh?" said Jack with a grin.

She started to mime finger-snapping in a slow rhythm. "'To keep the elephants away,'" she said, continuing the old joke.

"'I don't see any elephants around here.'"

"'See? It works!'" She shrugged and held up her hands in surrender. "I ought to tell that joke more often. It's a lot clearer than just saying, 'You can't prove a negative.'"

"Seriously, Sue. Do you honestly think that Barstow believes Billy could

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be violent?"

She nodded. "Oh, if you asked her point blank like that, I'm sure she'd deny it. But deep down, that's exactly what she's afraid of. The way she sees it, violent criminals dress, think and act differently from everyone else; therefore, anyone who dresses or thinks or acts differently must be, potentially at least, a violent criminal. She believes it because that's what she's been told over and over again."

"So what's somebody like that doing in an elementary school?"

"Same as the rest of us. Teaching kids."

"Shouldn't be. Not with ideas like that."

"Well! Listen to Mr. Free Thought! You think you're immune?"

"I don't think in sound-bites, if that's what you mean."

She smirked. "You don't, huh? OK, smarty, here's a little test for you. I'll give you the start of a phrase, you finish it as quickly as you can. Ready?" She waited. When he saw that she was serious, Jack leaned forward in his seat and nodded.

"'War . . . hunh! . . . '" Sue grunted.

"'What is it good for?"

"'Ban . . . "

"'The bomb.'"

"'Silence is . . . '"

"'Death.'"

"'Impeach . . . '"

"'Earl Warren.'" Jack made a face. "Where did that come from? I mean Nixon. 'Impeach Nixon. Now.'"

Sue laughed. "See what I mean? We all have them and don't even know it. If I don't grunt after the word 'war' I get 'War is hell,' but that's a different generation. I'd probably get 'Silence is golden' from your son Jim. Barstow thinks like most of the parents do, Jack. You're the one that's different. You're older than most of them."

"So they all think like Barstow?"

"It's not thinking, really, it's a belief system. My point is that half of what you're feeling has nothing to do with logic. It's an immune reaction. Dawkins' memes."

Jack chewed on this for a while. "We're the same age, Sue," he said. "How'd you get so smart while I just got old?"

She shrugged. "I've worked with little people for a long time. They don't have much of a, I don't know what you'd call it, like a viral load—a memeal load—they don't have much of a mimetic load yet. They pick up and discard these things very readily, trying to form combinations. That's the real reason why 'Kids say . . . '" she paused.

"' . . . The darnedest things.'"

They both chuckled. "It keeps me fresh," she went on. "They ask 'why' all the time. Sometimes it's straight factual things, like 'why is grass green.' Sometimes I can hear the little wheels going when one of them asks 'why is the grass green and not blue,' I have a lot of fun coming up with answers for that kind of thing. But when I get a question like, "Why does the policeman have a gun?" it makes me really stop and think: do I really have an answer or just an infection to give that kid. Don't you see this with Billy at all?"

Jack looked thoughtful. "I may have been too busy with my own infections to notice. Wiping my mental

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nose, I guess," he said.

"Well," said Sue with a smile, "I have to go. It's been fun, as always, Jack. But you're still a cheap date."

On his way home, Jack passed the ball field where Billy's pickup game was in progress. Both teams were shy a few players: no shortstop, some kid's big doofus of a golden retriever eagerly playing outfield for both teams. The infield stood ready and Billy was with a little huddle off the third base line, so his team must just be up. Now there's a nice thing about baseball, Jack thought. You don't need uniforms, not for play and not even for spectators. Everybody can just see who's on what team.

Billy waved when he saw his father. Jack waved back. It was Billy's up. He settled over the plate and nodded to the pitcher. There's the ball—it chirps, it's in the zone—swing—and a miss. "Strike," called the catcher. "Yeah," agreed Billy and settled in again. There's still another nice thing about the game, thought Jack. The rules are clear and simple; you don't really need an umpire, either, if everybody plays fair. "Here's the pitch," sang Jack to himself, all those old TV and radio voices from his childhood giving him the rhythm. Billy twitched but held his ground, "Low and outside . . ." the ball honked as it passed the plate " . . . ball one." It smacked into the catcher's glove.

Settle in again. "There's the pitch . . . in the zone . . . swing and it's a line drive up to first; but wait, where's the shortstop? The first baseman comes in from his position to meet the ball . . . too late. Billy Phillips is safe at first for a single!" Jack waved to his son, hopping up and down at first base. Billy waved back, distractedly, his attention fixed on removing the smartball's sensor belt for the next batter, who was trotting out to first to pick it up. And there's another nice thing about baseball, he thought, then stopped. *Go home, Jack,* he thought, *or you'll get started on that other great American pastime: making baseball analogies.*

Bill the Pill Phillips, Hall of Famer, sauntered loose-limbed and relaxed up the walk to the door of his house. Glove over bat, bat over shoulder, he kicked the dust off his sneakers on the doorsill and went in.

"Dad? You around?" he called from the front room.

"I'm down in the Dungeon, Billy." his father's voice came from the air. "How was the game?"

"Great. I got a double and two singles and one of them brought a guy in. Five innings. We lost."

There's still another great thing about baseball, Jack started to think. By now that little piece of his mind was beginning to sound like Howard Cosell doing a George Will impression. Or maybe it was George Will doing a Howard Cosell impression. *Shut up,* he admonished it. "Terrific," he called, "I'll be an hour or so, yet. Why don't you get cleaned up and grab a snack or something?"

"OK." Bill the Pill went up the stairs to his room. He set the bat down in the corner and looked around. It looked different, somehow, now that he had shipped all his trophies and

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awards off to the Hall of Fame. Better off there, he thought, where they can inspire others. They're just clutter here. Then his eye lit on the box.

"Hey, Bunter!" Billy called.

No response.

"Bunter?"

"Yes, Master Bill."

"What did you do today?"

No response. Billy pulled a face.

"Bunter, who is Anne?

"Anne is the Queen of Oogaboo," was the immediate reply. *OK,* thought Billy. *He still works.*

Then he had an alarming thought. "Bunter," he asked, "did I leave you on all day?"

"I don't understand the question, Master Bill."

Billy thought a moment. Something Jim had said. Ah. "Bunter, have you been in active mode since last night?"

"Yes, Master Bill."

"The whole time?"

"Yes, Master Bill." This is bad, thought Billy. What if I messed something up? Well, just ask him. Jim did.

"Bunter, did it hurt you to be in active mode all day?"

"No, Master Bill."

"Why?"

No response. This was like pulling teeth. Oh, well, it was only the first day. Try something else. "Bunter, what did you see while you were in active mode today?"

"I saw you wake up. I saw you get out of bed. I saw you go to the door. I saw . . . "

"Stop. Stop. What did you see when I wasn't here?"

"The first time you were not here, I saw the room. The second time you were not here I saw the room with the closet door shut. The third time you were not here I saw the room without the bag of books. A fly came in and walked on the wall. The fly left my field of vision. The fourth time you were not here I saw the room with the bag of books and without the things in the corner that you were carrying just now."

"That sounds awfully boring." He thought over Bunter's litany for a moment, then realized how it was done. "I bet you're something else at 'These two pictures are almost the same.'"

Once again, there was no response. Billy went to the corner and picked up the bat and glove. "Bunter, are these the 'things in the corner' that you were talking about?"

"Those are the things that you were carrying when you returned to the room."

"Yeah, but do you know what they're called?"

"No, Master Bill."

"This is a baseball bat. This is a baseball glove." He held them up as he spoke. "Do you know how to play baseball, Bunter?"

"No, Master Bill."

"All right. I'll explain it to you." He brought the box over to his desk and pulled over a piece of paper and a pencil. "OK. First, you have this diamond, see. Now you stop me if you have any questions . . ."

They were still at it an hour and a half later. Billy was saying, "No, a run isn't the same as a home run. A run is always just one point but—" when they were interrupted.

"Bill! Dinner's ready." Dad called.

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"Take a break now and come on down."

"OK!" he called back. "Come on, Bunter, let's go eat."

"Sorry, Billy, I wasn't expecting a guest. I didn't set a place for Bunter." Dad turned from the stove with a full plate as Billy settled himself in.

"That's all right, Dad," said Billy, unfazed. "He can just sit here and watch." He propped the box up against the fruit bowl. "I've been teaching him about baseball."

"Really. Why?"

"Well, 'cause he noticed the bat and glove and didn't know what they were, so I told him, but then I figured that just the names were no good if you don't know what they mean, so I started explaining it and, well, like that." Billy's words rushed out as Dad set down two full plates and settled himself.

"Bunter *asked* about them?"

"Not really. Sort of. See, I asked him what he did all day and all he did was watch a fly on the wall." He paused. "Oh," he looked over a little sheepishly, "I might have made a mistake. I left Bunter in active mode since last night. Does that hurt anything?"

Dad thought a moment. "No, I don't think so. The way I understand it, active mode just means that Bunter can start a conversation on his own; and that's only with a control name. So active mode just means that he can speak to you without you speaking to him first."

"If I may, Master Bill," said Bunter, startling them both, "active mode also requires me to make an attempt to anticipate the future needs of all controls that may be present. In passive mode, I am to assume that the sequence of events that I observe is the optimum sequence."

"Huh!" said Dad. "Bunter, can you understand me?"

"Yes, Dad," said the box.

Billy dissolved in a fit of giggles and Dad laughed. "He's not *your* Dad, he's *my* Dad," said Billy, when he caught his breath.

"I beg your pardon, Master Bill; and yours, sir. I inferred an incorrect form of address," said the box, in a perfectly serious tone.

"Quite all right, Bunter," said Dad. They ate in silence for a while. "Let me try something, Billy. Bunter," said Dad, "what is an 'out' in baseball?"

"An out is three strikes, sir," said the box.

"And what is a strike?"

"A strike is counted against a batter if the batter swings at a pitch and misses, or if the batter fails to swing at a pitch that passes through his strike zone."

"Billy," asked Dad, "were you reading from a rule book?"

"No, Dad," said Billy. "I just drew some pictures and talked. He sure sounds like a rule book though, doesn't he?"

"Sure does." Dad looked at the box for some time then said, half to himself, "Hasn't been with you long enough. That must be the speech pattern and vocabulary he got from Jim." Neither Billy nor Bunter had a response to this. Then Dad asked, "Bunter, what is the distance between the bases on a baseball diamond?"

"Approximately fifteen centimeters

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on average, sir," said the box.

Dad laughed out loud and Billy gaped at the box, astonished at the answer. "That's what I thought," said Dad.

"What? What did you think?" asked Billy.

"Well, did Bunter ever see a baseball diamond?"

"Sure. I drew him a picture."

"You drew him a picture. And how far apart were the bases on the picture?"

Billy stopped. "Oh," he said. "I see." He smiled crookedly at the box. "Bunter, you dummy, that was a picture. Not a real baseball diamond."

"'First, you have this diamond, see?'" said the box in Billy's voice. "I beg your pardon, Master Bill," it said in its own voice. "Please explain." Billy just shook his head in astonishment.

"Well, well," said Dad. "I see we have a bit of a problem with recognizing representations; and a bit of a temper, too. And we can do impressions. Isn't that something." He started to clear the table. "You know what, Billy? I think you hit on the crux of Jim's problem with these things. I'm going to give Jim a call about this, but let me make a suggestion. Try to keep Bunter in active mode and keep on doing what you're doing; you know, talk to it and explain things, and just generally keep it around. I want to see what happens."

"I don't get it. Is there something wrong? Is Bunter broken?"

"Not at all. Just a little more complex than we thought. His command of the language fooled you. Fooled me. He can do arithmetic, he knows enough physics to figure out what would happen if you dropped a rock off a cliff, but he hasn't got anymore common sense than the average infant. Stands to reason, I guess. He was wiped only, what, last night?"

"Yeah, he was," said Billy, warming to Bunter's defense. "So you can't expect him to know everything. He hasn't had any time."

"Right. But what's interesting isn't so much what he's learning as the way he's learning it. Babies can't talk about how they learn. Bunter can. This should be very interesting." He closed the dishwasher and started to wipe down the counter. "All right, my boy. I've still got some things to finish up in the Dungeon. You get started on your homework, now. No more baseball for a while."

A short while later, Billy sat at the desk in his room. The box was propped up against the lamp before him. He rested his chin in one hand, and doodled on his paper with the other—circles, squares and slashes. "Bunter?" he said, looking into the camera's eye.

"Yes, Master Bill."

"Is it true what Dad said? Can you do math problems?"

"I can calculate. Yes."

"OK. Try this. How would you divide three apples among two boys? Fairly?"

Later that night, Detective William "Wild Bill" Phillips, undercover cop, stood by the window in his darkened stakeout, cold eyes scanning the vacant lot below. It was quiet just now, peaceful in the moonlight, but some-

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thing would break tonight. He could feel it. Better check in with his backup. "Can you hear me?" he whispered.

"Yes," came the answer through his earpiece.

"Can you see me?"

"No." Billy sighed and turned away from his bedroom window and the view of the backyard.

"Let's try some light." He turned on the desk lamp. "Can you see me now?"

"No."

Billy looked closely at the backpack hanging on a hook at the rear of his open closet. "Well, I can see you clear as anything."

There was no response. Billy turned on more lights, crossed to the closet and examined the bag critically without touching it. Like almost everything else associated with his school, the knapsack was uniform, although Billy liked to think of it as "official." This backpack was the official school carryall, a plain black nylon affair with a single pouch on the back and the school's logo, the face of a smiling Ben Franklin, printed in white on the pouch. Dad thought the picture looked funny and called the knapsack Billy's oatmeal bag because of the picture, for reasons Billy had never asked about. You had to have one at Franklin; all your stuff had to go to and from school in the official bag.

Billy leaned over and studied the logo, looking for the small hole he had picked out of the fabric in Ben's right cheek. He found the hole, but couldn't see anything behind it. "Can you see anything at all, Bunter?"

"No, Master Bill," whispered his earpiece.

"Why didn't you say so? Here I'm thinking you just didn't have enough light."

"I did not have enough light," Bunter said flatly, as if that explained the situation. Billy opened the pouch and pulled out the box. "Well, I guess that's not going to work. I'll have to figure out some way to strap your eye up against that hole so you don't move. Or maybe Dad will get the remote eye done soon." He climbed up on the bed and set the box up over his shoulder.

"You're as bad as Tik-Tok sometimes, you know?" Billy set the book on his lap and opened it to his mark. "We've got to get you to school somehow. Sometimes you're pretty dumb." He looked over his shoulder to check the line of sight. "Sorry, I didn't mean dumb exactly, but ignorant. There's a lot of plain regular stuff you don't know and I bet you could learn it if you went to school. Can you see the book?"

"Yes."

"OK, here we go. 'Chapter Five. The Roses Repulse the Refugees . . . '"

A week or so later, Billy sat attentively in Miss Barstow's classroom. It was a dreary day outside, raw and threatening rain; the bright lights and warmth indoors made it easy to pay attention. Besides, Bunter was coming to class now, too.

Miss Barstow pulled the world map down from its overhead roller and moved over to the big globe in the far corner of the room. Billy shifted obviously in his seat, trying to give the im-

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pression that he was merely turning to face her, keeping his gaze straight ahead. At the first opportunity, though, he shifted his eyes to the right so that he could make out his official bag hanging over his official coat on his official named coat hook at the back of the room. The angle looked clear to him.

He brought his eyes back to the globe and Miss Barstow, licked his lips and left them partly open. "This is geography," he breathed, without moving his mouth. "Can you see the globe?"

"Yes," was the equally quiet response in his left ear. He nervously touched his neck on that side, trying not to think of the bit of cotton he'd placed to hide the earpiece. After three days, he was going to have to come up with something else. At least sticking the mike pin under the knot of his tie seemed to work fine.

"On this map," Miss Barstow was saying, "if we want to fly from New York to Japan, and we want to go by the shortest way, it looks like we just draw a straight line from one to the other. Like this." She pulled a pointer across the flat map, pulling a wavering red line out of New York as she went. "It almost goes through Oregon and then out across the sea and all the way across the Pacific Ocean and not near much of anything until we get to Tokyo." She tapped Tokyo and the line thickened and straightened. "It doesn't look like there is any quicker way to get to Tokyo, does there?" A few kids dutifully shook their heads at the rhetorical question.

"Now look at the globe." She turned it in its mount so that the North pole faced the class. "If I draw the same route that we have on the flat map, it doesn't look like the shortest route at all, does it?" She drew in a line of red light with her finger, more or less along the 40th parallel, this time to fewer shaking heads. "Maybe I could fly this way," a green line dipping south through Hawaii, "or this way," a yellow arc along the line of the Aleutians, "or even this silly line right over the North Pole." A blue line formed under her hand. "What do you think? What is the shortest route from New York to Tokyo?"

"Build a Hiergargo Tube," said the voice in Billy's ear. He blinked, controlling a start, then parted his lips and breathed, "Build a what?"

"Hiergargo the magician built the Tube that Quox the Dragon used to carry Tik-Tok and the army of Oogaboo from one side of the Earth to the other. It went through the Earth, not around it, so it was truly straight, not a projection. A similar Tube built through the Earth, in a straight line from New York to Tokyo, would be the shortest route between those two cities."

Billy thought about this a moment, picturing a Tube through the globe before him. He felt a thrill; of course it was right. He could see it was right this time.

Billy raised his hand.

The next afternoon Jack Phillips was right on time for his appointment with Miss Barstow. He breezed through security, up the stairs and to the room.

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"Mister Phillips," she greeted him, "thank you for coming by."

"You're welcome, Miss Barstow, although I have to say I'm a little embarrassed at the circumstances. You mentioned a disruption again. What seems to be the problem this time?"

Barstow explained about the geography class the day before. "Then," she concluded, " for whatever reason, William brought up this bizarre notion of a tube through the Earth complete with dragons, fairies, magicians and all sorts of things. The other students understandably started laughing. What was worse, the issue lasted for the rest of the day. In the history lesson later in the day I asked a question and distinctly heard one child say 'Billy's dragon,' although he did not intend me to hear it."

Jack refrained from asking if that child's parents had received a note, too. Instead, he said, "It's true, you know."

"What's true?"

"The tube. It's a problem set in almost every introductory physics text. Goes back for years."

"Are you suggesting that William is reading introductory physics texts?" She looked a little confused.

"No." Couldn't hurt, though, he thought. "I'm just saying that the idea is not incorrect."

Her face tightened a little. "That's really not the issue, Mister Phillips. If William wanted to pose the idea of a tunnel through the Earth, he could have done so without the dragons and magicians. That he did include them tells me that his intent was to disturb the class. That is the issue."

"Ah. That all came from *Tik-Tok*. That's where he got the idea."

Barstow looked like someone who was certain that she was close to the source of a bad smell but afraid of what she would find. "Tick-tock," was all she said.

"Tik-Tok. Of Oz. One of the original Oz books. That's where Billy got the idea."

"I'm sorry, I'm not familiar with it." Jack wasn't surprised. "Even so," she went on, "why all those others things: the dragons and magicians and fairies and such? I was not familiar with the tube concept, but it is a good idea. It could have been a useful addition to the class if William had not," she hunted for a word, "embellished it that way. My conclusion is that he did it to draw attention to himself. I asked you here to see if you knew of another reason."

Jack revised his opinion of Barstow from pretty to prissy. He took a breath. "I think he did it that way because he's eight years old. When you are eight years old, you are the center of the universe and things relate to each other only through you. At the same time, when you are eight, experience tells you that everyone else already knows everything that you know. Billy only just read the book, but I don't think that it occurred to him that the other children had not; certainly it did not occur to him that you had not read it." Jack bit back a harsher comment, then said instead, "He really thought that you knew what he was talking about. You work with eight-year-olds all day. I'm sure I'm not telling you anything you don't

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already know."

She seemed to think this over. Now might be a good time to try out Sue Waters's theory. Jack broke the silence. "Let me ask you something. Why would you assume that Billy was deliberately disruptive instead of, oh, I don't know, say merely eccentric?"

Barstow smiled as if Phillips had just handed her the opening she needed. "I see no real distinction between the two, Mr. Phillips. To be deliberately disruptive is to consciously set oneself outside of the group, to willfully weaken it by withholding one's contribution, to distract its focus from the common goal to oneself. Eccentric behavior may be less conscious but its effect on the group is the same. In the end, therefore, there is no distinction between the two." She sat back with obvious satisfaction.

Jack mentally replayed all this, translating it into plain English as he went along. He tried very hard not to react visibly. She seemed almost to be reciting something and acted as though she was simply reminding him of some simple fact he had merely forgotten for the moment. He couldn't have been more astonished if some tiny, repulsive creature had briefly popped out of her right ear and gibbered at him. He was a little frightened, too, because she clearly expected some similar creature to pop out of his head and give the countersign. He was suddenly a little afraid of the consequences if he failed.

"Well," he said, stalling while he tried to review her statement in his mind once again. "I see," he said. Don't try to figure out her referents, he thought; not here, not now. "But don't you think that intent counts for something, at least at this age?"

Barstow seemed to consider this. "You mean as a mitigating circumstance? In William's case?"

"Yes," said Phillips, at a loss for any other answer.

"Very well," she said. She had the air of a teacher accepting C work from an A student on an off day; disappointed but willing to let it pass this one time. "Normally, that would be appropriate only for a younger child, but if we assume, shall we say, special circumstances in William's development I can accept that. For now. We can work on a solution from that basis."

There was that little creature again, this time from the left ear. He chose to take her last comment as a cue. "I'm frankly at a bit of a loss here, Miss Barstow," he said, "what should I be doing?"

"Nothing unusual, really," she said. She smiled as if happy to see her A student back up to expectations. "If we assume . . . ah . . . let's call them delays . . . in affective development, why then you can simply act appropriate to the affective cohort; in other words, work with William as if he were two years younger. Do not ignore but don't reward nonconformal behavior and where possible point out the correct course." She sat back and folded her hands in her lap, obviously satisfied.

Jack felt that he had to move carefully, although he still wasn't sure why. He still wanted information on his other problem. "Billy tells me that he's been having some difficulty with

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a Farlini in his class," he said, as flatly as he could manage.

"William Farlini. Yes." She looked somber, "I imagine there would be some conflict there."

Jack stayed calm. "Have you noticed the problem, then?"

"I wouldn't call it a problem, exactly, Mister Phillips, although I can see where it would be a source of some discomfort for your William." She's going to recite something again, thought Jack. "Master Farlini is a natural shepherd, you know, and he is therefore going to take on that role in any group. His inclination would be to correct nonconformal behavior that is too far out of norm; frankly, that aspect of his affective development is rather advanced for his age." She looked concerned, though Jack wasn't certain that the concern was for Billy. "Yes. I can see where, given the disparity in cohort development, Master Farlini would appear to be a constant opponent." She brightened. "But you understand, of course, that it's all part and parcel of the same thing. Once William begins to track back towards his cohort norm, Master Farlini's corrections won't be needed. That's the natural course of these things, you know."

Jack blinked. Shepherd. Did that make the Gestapo sheepdogs? What breed was the Inquisition? All he said was, "Ah," and nodded.

Barstow took this as some kind of conclusion. She rose and held out her hand. "I'm glad we could find some path to resolution, Mister Phillips. We can work this out."

Jack rose as well and shook her hand. It didn't feel like a talon at all. "Thank you for your time, Miss Barstow," he said automatically, and left.

He paused in the hallway as the door closed behind him. Still a little shaken, a little disoriented, he wanted some time to himself. He turned away from the short route to the stairs, intending to circuit this floor and arrive at the stairs from the other side. He wandered slowly down the middle of the empty corridor and turned the first corner.

Classroom doors alternated with big old-fashioned corkboards on both walls of this corridor. Jack paused before the first board.

A small brass plaque at the bottom of the board was engraved "First Grade." Tacked in one corner of the board was a small card that read, "Our First Thanksgiving." The theme of the display, he supposed. The children's tributes filled the rest of the board, each a single piece of paper cut in the shape of an oversized leaf. One had just the word "Pilgrim," with each letter a different fall color. Another showed a three-quarter profile of a turkey, tail spread wide and colored, oddly, like a peacock's. A third was a hand-colored clip-art print of a cornucopia. Phillips relaxed a little. Traditional indeed, he thought, I did the same kind of stuff myself.

He moved down the hall and stopped before another board on the opposite side. "Fifth Grade," read the plaque on this one and the card, "Freedom From Fear." The medium for this art class looked like stock clips

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pulled from some common classroom file arranged with some kind of software. Composition and treatment were childlike but the perspective and surfacing were perfect. It was a weird effect.

Here was a scene under a mare's-tail sky, perfectly rendered. A street divided the scene from lower right to center, where it disappeared behind a multistory brick building dominating the left foreground. To the right of the street, a sunlit field, a park maybe, stretched off to distant mountains that were oddly placed but perfectly lit. A family of three walked away from the viewer along the sidewalk bordering the park side of the street: man in a loose fitting brown suit, woman in an ankle-length green dress, walking behind a pigtailed blonde girl in the Franklin school uniform. With the Sun to the upper left, they cast three perfect shadows on the perfect lawn. The same light put the leftmost half of the building's brick wall in shadow. In the dark corner crouched a figure, a cartoon stereotype of a criminal: knit cap, bandanna, running sweats, holding some kind of sack in one hand and a stick or pipe in the other. The figure was stopped in mid-stride, twisted away from the wall and looking up as if from concealment. Jack followed its gaze to find, at the top of the building, four, no, make that six, figures—properly scaled and in perspective, of course, lined up along the edge of the roof facing the street. He looked more closely. They were armed and uniformed police officers, standing at ease in a wide-spaced line, gazing benignly down at the family walking along the sunny side of the street.

Jack pursed his lips at that message and moved at random to another picture on the same board. This was also a street scene; looking around briefly he saw now that all of them on this board were. It must have been part of a recent lesson. In this one, the point of view was from standing eye-level in the middle of the street, a tree-lined street empty of traffic or people. Lawns backed the trees and houses stood on the lawns, the whole arrangement marred only by the eerie flatness of the surface. The low angled light reinforced the perfect perspective and drew the eye to the end of the street, to the sky above the horizon, the center of the composition. The upper two-thirds of the work was a gorgeous cloud-filled sky, full of pinks, reds, andoranges that were all the warmer for the deep, deep blue seen through the occasional break in the clouds. A couple of bright yellow beams forced attention back to the center where the clouds concealed the low Sun. Or was it just the Sun? He looked more closely. No, not quite. It looked like a face morphed with the Sun, yes, it was, he was quite sure. It was a face. It was a smiling face. It was a smiling, ruddy, jolly face with—was that a peaked octagon cap?

Jack turned away and walked around the next corner, to find more cork boards. He intended to leave the building but now he was sensitive to the displays and they kept intruding at the edges of his vision. At the end of the corridor the last bulletin board looked different from all the others, busier, and it stopped him.

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"Eighth Grade," the plaque read, and the card "We Become One Country." . . . *Under God,* completed Phillips, despite himself, and he thought of Sue Waters's little game in the deli. This board was filled with comic strips. He corrected himself. Graphic stories, they called them now. They were all done in black and white and all obviously used the same clip-and-crunch technique that the fifth graders had used, but these all told stories. Some were single panels, like editorial cartoons. Most were multiple panels, although all were done within the boundaries of the same size sheet of paper. None of the panels used dialogue balloons; there were no individual characters here. Instead, the panels all bore captions that he would have taken for the lettering of an experienced hand had not the sameness across the works given it away as simply a common machine font.

Here was a particularly intricate work. The first panel was a cartoony aerial view of the northeastern United States. The physical map had its own scale, the figures overlaying it quite another. It was the kind of effect *Rocky and Bullwinkle* used so often for their travel scenes. Off the New England coast a ship, of the wrong period, was run aground on an oversized rock. Some small distance inland was an arc of stockade fence, starting and ending at the seashore and centered on the rock. Within the protected arc, a group of stock Pilgrim figures—men, women, and children—knelt in an inward-facing circle. Outside the stockade, scattered here and there across the landscape, were small groups of Indians. All were male, all had a feather or two in their hair, and all looked intently towards the group behind the stockade. "We give thanks for our new land," read the caption.

The next panel showed more of the country, the stockade now running just west of the Mississippi. Caricature towns with prominent church steeples dotted the east. Family groups stood here and there, but the figures were in colonial dress now. Indians, still feathered and glaring, stood in groups to the west of the stockade. To the south, two circular areas were marked off with split-rail fences; inside the fences, black figures in ragged dress stood in ranks, singing to the leadership of a single white figure in a frock coat holding a book. The caption read, "We explore our new land and come to love her. Not everyone who came with us could learn our difficult ways quickly. . . . "

The caption finished in the next panel, " . . . but in time they did and together we settled the whole of our beautiful new country together, as one people, from sea to shining sea." Now the view showed the entire country. The stockade fence lined only the border with Mexico and Canada. Within those boundaries small towns, each still with a prominent church steeple, dotted the landscape. A railroad snaked across the center of the landscape. Figures of family groups filled the rest of the space. Some of the figures were black, mostly in the South; some of the figures had feathers in their hair, mostly in the West; all of them were now dressed in stereotypical Victorian up-

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per-class garb from the late nineteenth century.

The fourth panel was twice the size of the others. The aerial view was still centered on the United States but pulled way back so that the arc of the Earth showed. The perspective was as through a fish-eye lens. The stockade fences were replaced with stone walls, outlining the entire boundary of the country. Alaska was also surrounded by a fortress wall, as was a tiny Hawaii distorted by perspective. Distorted coastlines crept over the horizon on the far shores of the oceans to the east and west, most of the hemisphere showed to the south. All the lands outside the walls were filled with enemies. To the east, a mustachioed figure in a WW I spiked dress helmet stood glaring across the ocean. At his shoulder, a steely-eyed figure in black SS, his right arm raised in salute to ranks of gray figures in WW II coal-scuttles. Behind them, a Stalin caricature pointed towards New York, instructing a team of fur-hatted soldiers in the aim of a huge mobile missile. To the south of them, a wild-eyed stubble-faced Arab in traditional dress straddled the Sinai Peninsula, guarding a field of Texas-type oil derricks. He held a round cartoon bomb in one hand, fuse lit, and a dagger in the other. South Central Africa held a single figure, a half-naked black warrior with a spear raised in threat. To the west, across the Pacific, rank on rank of round-faced Chinese in Mao jackets stood behind a Japan filled with evil-looking figures in WW II army uniforms, cheering on a huge war fleet spreading radially out from the island like steel cockroaches. South of the Chinese, large trees half hid black-clad figures in conical hats pointing rifles at the coast of California. North of the Chinese, mountains hid the figures of snipers firing across the Pacific at Oregon; only their faces, topped with close-cropped hair, showed over their rifle barrels. The Indian subcontinent peeked over the horizon, crammed with a sari-clad horde surrounding a missile tipped with a trefoil-marked warhead. South America was filled with enemies too. Fat dictators in fanciful uniforms, chests full of medals, sat on mountain thrones directing the action. Stake trucks dropped sombreroed peasants at the Mexican wall, where they joined others with pick-axes and shovels in its destruction. A smarmy Latin in a tailored suit held out both hands to the border in offering; three hypodermics laid out on one hand, a half-dozen small flat bags on the other. Stereotypical banditos hacked and burned the Brazilian rain forest. Cuba bristled with missiles and sent makeshift rafts to break up on the wall surrounding Florida. Canada, oddly, was depopulated. It was covered by mountains, trees, and a single, oblivious moose drinking from the St. Lawrence River.

Inside the fortress wall, all was determined and orderly activity. Women in overalls and bandannas entered smoking factories from which floods of munitions gushed. Men in uniform peered over the walls, backed by artillery and missiles. Warplanes of all periods lifted into the air, headed east, west and south. The capitol building in

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Washington, D.C., stood prominent, fronted by a man in a suit at a microphone, exhorting a cheering crowd of other men in uniform. In the Midwest, a man stood in the center of a packed football stadium, holding aloft a book with a cross on it. Across the country similar men held open the doors of churches to eager throngs. Alaska was covered with incongruous Texas oil derricks; tanks guarded a pipeline running through depopulated Canada from the Alaskan wall to the wall around the lower forty-eight. The detail throughout was painstaking.

The caption on this oversized panel blandly read, "Many saw our beautiful land and got jealous and wanted to take it from us. For a long time, we had to fight to keep what we had been given."

The final panel was back to the size of the first three with the view closer in and once more showing only the North American continent. Canada was still depopulated; even the moose was gone. Across the country, everything was at peace once again. Clean factories swept in an arc from the Great Lakes to the capitol building in D.C. Farms dotted the landscape here and there in the South and Midwest. A couple of cowboys in the far West herded cattle toward a handful of lumbermen in the Northwest. A movie director peered through his camera in southern California. Those not dressed for some specific occupation wandered the landscape in the current retro-style suits and dresses, entering or leaving the still-prevalent churches or talking quietly in small groups.

The wall remained in place, but now it was broken at New York, Miami and Tijuana. In the gaps stood large square buildings. Outside the wall, each building was the focus of a funneled crowd. On the Mexican border, peasants bearing hoes waited for entrance; outside New York, shiploads of people in anachronistic ethnic European dress waited their turn to land; outside Miami, boats and rafts floated at anchor, loaded with patient Latins and blacks dressed mostly in ragged shorts. A much smaller number left the building exits inside the walls; those that did were all done up in suits and dresses. The caption on this panel closed the story with, "But those people soon learned that we cannot be conquered. They can come and live with us anytime they want, but only if they come in peace and only if they learn our ways. Because that is how we are one country."

By this time, Jack was beyond reaction. He turned away from the board and grimly walked the rest of the circuit and down the stairs. At the bottom, something caught his eye; the library entrance had changed. A large easel holding a poster now stood to one side of the double doors. Across the top of the poster were the words "We give thanks for our unity." Below it, some kind of text art that he couldn't work out right away. A sort of a yellow spiral expanded as it unwound and threw off a yellow path to something in a kind of greenish halo at the end. He moved closer and studied the green thing. It was a single word, made up of caps, but each letter squeezed or expanded, distorted, jum-

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bled, varying in height, together giving the impression of a huddle of buildings, the whole washed in luminous green as if it glowed from within. That big one in the middle, stretched above them all like a tower; no, a steeple, there was a little cross on the top. The letter A? Suddenly it snapped into focus: the word was "EQUALITY." He rapidly deciphered the rest of the lettering on the yellow strip: "Conformity is the path to equality."

Now he recognized the image, too: the yellow brick road and the Emerald City. It was from the MGM version, he noted, not the real thing. Thank God for small favors. He took a deep breath to calm himself and turned away, soiled.

Franklin's bust still stood on its pedestal opposite, stone eyes staring at the easel. "Aw, Ben," said Jack, "at least they could have given you a blindfold." He turned on his heel stalked out of the building and walked into the rain.

Jack arrived at home with his anger damped and a funk building in its place. He shook off the wet, tried to shake off his mood, and went upstairs to find Billy in his room with a word game of some kind on the computer. Bunter was rigged in a kind of handmade string sling around Billy's neck. Jack waited quietly in the doorway.

"Tabby," said Bunter, "t-a-b-b-y."

"I don't think so," said Billy. "It says 'famous cat.' 'Tabby' is a kind of cat. Not a name." Bunter was silent.

"Felix, I bet," said Billy and typed the word with one finger.

"You are right, sir!" the computer blatted with a canned clip of Ed McMahon. "See?" said Billy. Bunter remained silent.

"OK, try this next one: 'Famous mouse,' six letters with an I."

"Mickey," said Bunter, and spelled it out.

"'Mickey' doesn't start with I, silly," said Billy.

"'Famous mouse, six letters with an I,'" said the box in Billy's voice.

"Boy. Touchy," said Billy. "I meant starts with an I."

"Ignatz," was Bunter's immediate response and spelled this one out, too.

"There you go!" Billy typed it in and was rewarded with "Okey Dokey," in the voice of, oddly enough, Mickey Mouse.

"Hey, Billy."

"Hi, Dad." Billy paused the game and turned in his chair. "Was that meeting with Miss Barstow all right, I mean . . . am I in any trouble or anything?"

Dad forced a smile and said, "Nothing to worry about." *Not for you to worry about, anyway,* he added silently. He noticed the box in its sling around Billy's neck and pointed to it. "Here's something new. What's the idea?"

"Nothing much, really. It was just sort of a pain to keep moving Bunter around so he could see stuff and sometimes I'd knock him over and, well, this is just easier. Now he can see what I see and I don't have to worry about it."

"Good idea." His designer's eye, unbidden, noted the several loops wrapped here and there around the

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box and replaced them with a fitted pocket. The single loop of string had to be pulled over the head, had a fixed length, and torqued to one side when Billy leaned forward; replace it with U of cloth and a Velcro closure. But his heart kept his mouth shut and he just said, "That's really clever."

Billy rewarded him with a proud smile, which faltered after a moment. "Uh, Dad?" he paused. "There's something I didn't tell you before you went to see Miss Barstow. I think maybe I should have."

"Oh?"

"Well, remember with the baseball thing when Bunter couldn't tell it was a picture? And then with the fly cause I left him active all day? Even though it didn't hurt him, I figured he must be pretty bored and anyway he couldn't really learn anything if he didn't get out to really see stuff, you know what I mean?" The words came in a rush. His father just nodded and waited.

"Anyway. Well, I've been taking Bunter to school." He stopped.

Dad grinned despite himself. "How did you manage that?"

Billy went over to the closet and took his knapsack down from the hook. "Like this," he said. He flipped the box out of the string web around his neck and snapped on the remote unit. He opened the back pocket on the sack, pulled out a sock, pushed back a book that was already in the pocket, firmly pushed Bunter down into the remaining space and stuffed the sock on top. He zipped shut the stuffed pocket and held it out. "See?"

"Uh-huh. I see." Dad looked closely at the pocket and saw the hole picked into the fabric. He carefully emptied the pocket again and looked at it more closely. He saw a piece of white bandage gauze glued to the back of the hole; on the outside, it had been colored with something to match the rest of the fabric and continue the interrupted pattern. "Bunter looks through here, is that the idea?"

"That's right," said Billy, forgetting the infraction and warming to his construction. "That way he can see out but with the cloth nobody else sees his eye. I wear the pins under the flaps on my jacket and the ear thing so I can talk to him and he can talk to me."

"Nobody noticed the earpiece?" Dad was drawn into it now.

"Nobody said anything. I put a little piece of cotton behind it so it looks like I have an earache or something."

"And how long have you been doing all this?"

"Oh," said Billy, less animated, aware once more of the problem. "About a week." He grew quiet once more. "So, anyway, I thought maybe I should tell you in case that's why Miss Barstow wanted to see you, but I kind of didn't think of it before you went over to see her."

"She didn't say anything about it."

"Oh. I thought maybe she knew because she got kind of upset about that Tik-Tok thing and all." He was uncertain now; perhaps he shouldn't have said anything.

"What's Bunter have to do with Tik-Tok?"

"That was Bunter's idea."

"Bunter's *idea?* How do you mean it was Bunter's idea?"

Billy explained the events leading up

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to his proposal of the tube in class and finished with, "... so when Bunter told me that, I knew right away it was the right answer. At least, I thought so. I guess I was wrong. Again." He paused, then added, "I think I would have thought of it anyway. It's just that Bunter thought of it first."

The engineer in Jack wanted to explore this development right away, and had a brief squabble with the father who saw his son in pain. The engineer lost.

"No, Billy. Don't beat yourself up. Your answer was right. It wasn't what Miss Barstow expected, and maybe she didn't like the way you gave it, but that doesn't make you wrong and it doesn't make you bad."

"Like Jim said, huh, Dad? 'That's just what she ordered, it's not what she wants?'"

Jack smiled. "Yes. Exactly like that." He thought of the meeting again and the displays on the wall. "Billy, did you bring your history book home from school? There are some things I want to ask you about."

Billy was a little puzzled at the request, but also comforted by the reassurance. He was willing to go along. "Sure, Dad. It's right over here."

Later that evening, dinner over, the two of them were finishing up in the kitchen. Jack was still in something of a funk but a little more optimistic than he had been. That afternoon he had felt as if he had suddenly discovered that some great silent plague was sweeping through his community. Now he was pretty sure that the plague had passed by his own home, at least for now. It was something; not much, but something.

It was still raining. What with being stuck indoors, a couple of hours of homework, bookwork, and what must have seemed to him pointless quizzes on history and civics, Billy was bouncing off the walls. It was all making Jack feel a little short-tempered.

"Billy, how about some TV?"

"Sure, Dad. What's on? Can we watch on the big screen down here? Can Bunter watch, too?" Once again, Billy had the box slung in the web around his neck.

"I don't know, why not, and sure. Come on, let's go see."

Billy careened into the front room, pulled open the drawer on the side table, scooped up the remote control, hurled himself into one of the wingbacks and turned the system on all before Jack was even over the threshold of the kitchen. The big screen was swinging down into position from its recess in the ceiling as Jack settled himself into the other chair. He wordlessly held out a hand for the remote.

As the screen locked down in place it came alive on the info channel. It always did, since the distributor had Jack pegged as an unregenerate entertainment cheapskate. Tonight it came up with four separate windows, each with different spinning, dancing text begging for attention over a looping clip of some show, each with essentially the same message: "Jack Phillips, just look what you're missing! If you'd subscribed to full serv, tonight you could be seeing ..." or prem serv or fam serv or sports serv or whatever.

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He stabbed the mute button before the thing started braying the messages out loud as well. This was not helping his mood.

He ran his thumb over the glide pad in the center of the remote, scanning the screen for the cursor. This little game of find the icon was new this season and he found the innovation particularly annoying. Some genius at the info channel had figured out a way to squeeze a few more pennies out of the service by selling even the presentation of the cursor icon and its start-up position to advertisers. Jack hated having to run his thumb back and forth across the glide pad until he found some object, he never knew what, moving in synchrony through the gyrating mess already on the screen. Intellectually, he knew the intent was to slow him down and make him study the ads on the screen; the emotional effect, though, made him feel like he had to stroke and soothe some skittish beast to get its attention. If the distributor owned the set he could accept it, but this was his system in his home.

Billy knew from experience not to comment at this point, regardless of how attractive he found the display, or he'd just have to sit through a lecture on how TV used to work. He jiggled around in his chair while he waited. Jack was starting to get really cranky when he found the cursor, a little red biplane, in the upper left corner. Curse you and worse, Red Baron, and your little dog, too. I am not going to pull you into the "About" box unless you're selling me a flight out of here, which you're not. He grabbed the plane with his thumb and crashed it into the "Listings" button at the bottom of the screen. The plane changed to a little stopwatch, three-quarters red, that started to count down immediately. He bit a knuckle and sighed. Forty-five seconds tonight. "Estimated set-up time" they called it. Bull. You must really think I'm stupid if you think I'm going to believe that it takes that long to grab the listings or that you have to do it this way. You just want me to watch your promos a while longer. Which, against his will, Jack did and fumed some more.

Finally the screen dissolved to two rows of white text boxes arranged in a time grid on a blue background, the cursor a simple white arrow. And hadn't that taken some doing, he reflected. He'd had to come on like a wild-eyed crypto extremist and threaten to invoke every community-standard suppression right in the law to get the service to default his display to only the two free services. In light of today's events, it had been dismayingly easy to convince them that he found even the titles of some of the shows on the pay channels offensive. What the hell. They probably thought he was a member of some kind of splinter Amish sect and ran his system with a hand-crank; the morons probably even believed it. He had what he wanted.

The yellow vertical line through the display showed that the current time was, mercifully, within a minute of the free real-time start of shows on both channels. He blew out a breath and tried to force off some of his mood with it.

"What'll it be Billy, comedy or dra-

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ma?" he asked. "We've got *Abbott and Costello* about to start on comedy, *Bonanza* on drama." Mindful of the day's pressures on both of them, he went on to offer, "There's *Lucy* and *Leave it to Beaver* and *Secret Agent* up later on, too. I'll skip-load one of them instead, if you want, so we can watch it now."

Billy fingered Bunter's sling and fidgeted, unable to decide. He said nothing.

Jack read the program descriptions. "The *Abbott and Costello* has 'Who's on First' tonight," he prompted. "It's about baseball. I don't think you know it, do you?"

"OK," said Billy, "*Abbott and Costello*. That all right with you, Dad?"

"No problem. Here we go." Jack clicked the "Real-time" button on the "Comedy" row just as the clock rolled over. The screen bumped into hi-def and cut to the full-width image of a wooden stage curtained in red velvet. He remembered to turn the sound back on in time to pick up the familiar opening, "Heeyyy Abb—bottt!"

This time, Jack Phillips was already waiting in the rear booth of the deli. When Sue Waters came in, he caught her attention with a wave; she walked back and slipped into the bench opposite him to find coffee and cake waiting.

"The day's a little sunny for undercover work, isn't it Jack?"

He looked distracted. "I guess. I'm not getting any sense of closure on this Barstow thing, Sue."

"What is it that you want, exactly?"

"I'm not sure anymore. Before I went in to see her yesterday, I guess I was still thinking conspiracy and looking for evidence. Failing that, I suppose I wanted to show her that Billy wasn't trouble, that he was just," he shrugged, "brighter than the other kids."

"And?"

He shook his head. "It was like I went through some kind of bizarre mind warp. The gist of it, I think, was that she was willing to think of Billy as emotionally retarded by a couple of years and at that she acted like she was doing me a favor. But then there was this whole undercurrent that was downright spooky." He paused, then shook his head again. "You know those old war movies where there's some Nazi or Communist political officer attached to a military unit? There's always a scene in there where the political officer argues with the commander in some kind of strange ideological language. You know what the individual words mean but the concepts are crazy. It was like that. Very strange. Scary."

"I know the scene. It's just before the loyal lieutenant arranges an accident for the commissar."

"Yeah. But I left my lead pipe at home yesterday."

Waters sipped her coffee and calmly said, "Affective cohorts. Conformal behavior groupings. Planned peer integration."

He stared at her. "Don't you go all pod people on me, too. You know about this?"

"Oh, sure. It's all the rage at in-service training nowadays; they've been turning out ed graduates with it for a

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few years. Some of us old fogies are calling it the fourth R: reading, 'riting, 'rithmetic and right-thinking."

"So this isn't just some strange thing with Barstow."

"Nope. It's the new wave in the Trad schools these days."

"Isn't that in violation of Trad charter? Teaching values? I thought that was limited to CS schools."

She looked at him with pity. "Jack, come on. It's simply not possible to explain anything to anyone without also saying something about your values."

"I'm just repeating what the law is." He sounded defensive. "Anyway, what I thought it was."

She grimaced. "The whole thing is just about labels, I think. If a parent is offended enough to take the school to court and the school loses, why, then the school was teaching values. The CS schools openly teach stuff that would get them sued elsewhere. That's why you think they're teaching values. We, on the other hand," she raised her right hand as if taking an oath, "are pure as the driven snow. We never teach values; we just teach alternate ways of knowing. She dropped the hand and shook her head. "Not my idea, mind you. That's how they settled it in the courts."

"Are all the teachers doing this?" he asked.

"Yes. No. Well, we're not all doing it," she waved a hand, "religiously. But it is part of the core."

"So what?"

"Remember how the system works. If something is part of the core, the students are evaluated on it. The teachers are rated based on their students' performance in those evaluations. It's a tidy little self-cleansing system. If I don't teach social conformity then my kids won't pass it; if my kids don't pass it then eventually I'm shown the door and replaced with someone who will teach it. I've got to do the minimum to get my kids past the evaluation or I'm out. I can't do anything for anybody if I'm out."

"So you knew all this the last time we talked and you didn't tell me." He tried to look hurt. "Why?"

She sighed. "Last time we talked you were haring off on your own conspiracy theory. You couldn't listen to anything else. I had a feeling that this was the real issue, but you had to find out for yourself. You wouldn't have believed me."

He reflected on this for a moment, then said, "You're right. I had my own agenda then." Then, with some heat he added, "But now that I do know what's going on, I want Billy out of that class!"

She stared at him and, as if testing him, said, "How do you mean that?"

"I mean that when they're teaching this conformity stuff I want Billy pulled out and put somewhere else."

"You can't," she said flatly.

"What do you mean I can't? I'm the parent, aren't I? Don't I have some rights?"

Sue was restraining some heat of her own. "First of all, as a practical matter, conformal behavior is a core affective goal and not a class. It's supposed to be included as such across the curriculum, so there's nothing to pull Billy out of. Secondly, even if it

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were isolated and even if you did succeed in pulling Billy out of that hypothetical class, you'd still be teaching him a value." She held up a finger, "I know I said it's not teaching values, but that's the board's circumlocution. Not mine. You and I know better." She put down her hand and leaned into him, restraint gone. "But as for rights, don't you dare talk to me about your rights. As a parent, you have responsibilities and one of those responsibilities is to pay attention to what your child is exposed to and help him to deal with them. You call yourself a free thinker and just look at your first reaction to an idea you don't like. Don't you dare put this on me, or on the school, Jack Phillips. Shame on you."

She sat back, face flushed and expression hardened. Jack sat back as well, his anger rapidly cooling. "I'm sorry," he said. "You're right. Again." He blinked. "But what can I do? As I was leaving Barstow, I saw these art displays that scared the hell out of me." He looked distraught. "There's got to be something."

She softened at his distress. "Jack, you're already doing a lot. Look at it this way: Billy wouldn't be in this situation if you weren't having an effect at home. You are doing something."

He grimaced. "Gee, thanks. I'm the cause of my boy's pain. Thanks a lot."

"Come on, Jack. Remember we were talking about Dawkins memes? Well, if you really accept that the best meme wins through honest competition, then you have nothing to worry about. Adjusting to new ideas is like another childhood disease. Don't go getting in a blue funk over this. Just keep doing what you have been doing."

"It's not honest competition. No matter what they call it, the schools are teaching values and I don't like it."

She snorted. "Jack, old shoe, welcome to the other foot. Think back a bunch of years ago when sex ed was the issue. It's people like you that said, 'Well, we're teaching health, not values. But if you don't like it, that's only fair. You can pull your kids out of class.' You kept your kids in. Then in some states it was evolution, remember that? 'It's just-a-theory vs. it's really science' went that argument. You didn't want to let them out of class on that one, but you already had a precedent and had to allow it. How about prayer? Both sides finally saw that pulling kids out did them more harm than good, so you all invented this so-called separate but equal three-tiered system we have now." She took a breath and had at him again. "So now it's turned around, the cryptos are in control and poor Jack doesn't like it and wants to pull his kid out of class." She stopped, clearly ready to say more, but unwilling to turn the discussion into an open brawl.

"Whoa," said Jack and held up his hands. "I'm sorry. Again. I drilled a nerve and I didn't mean to; guess I have a few nerves hanging out myself. I came here to ask for help, not to pick a fight."

They both worked on their food in silence for a time. Then Jack asked, quietly, "Why do you stay?"

She sighed. "Because I still believe I'm making a difference. The rewards are . . . fleeting . . . sparse . . . but they

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are real all the same. Every day all it takes is one pair of little eyes lighting up when a new idea clicks. I go looking for that, trying to make it happen; when it does, that makes my whole day." She brightened. "Sometimes I'll have a really big success. I'll see a big Ah-ha happen. Oh, it never looks spectacular and nobody else would notice it, but one of those can keep me going for weeks. Months." She looked up at him. "It's not a thankless job. Not at all."

"But there are things you would change."

"Yes. I'm not at all clear on the mechanism, but I know the principles. You do, too. 'The answer to free speech is more free speech.' 'The best school is a log with a teacher on one end and a student on the other.' 'The best way to learn something is to teach it.'" She started to warm to her subject. "The cryptos' plans are ultimately doomed to failure because they are a hothouse culture. They can't survive unless they bar disagreeable ideas, but to bar them they have to learn of them and that in itself infects their leadership. The thought police have to know what to suppress. In the end they can never stop telling people 'don't think about purple hippopotami' and that's their doom."

"An awful lot of folks get burned at the stake while they're learning that lesson," said Jack.

"Too true," she agreed.

Jack leaned forward, "Back to the question, though. If you could change one thing, practically, just one thing, what would it be?"

"Myself?"

"Yes. One thing in your situation."

"Hunh. I can't bring back tenure, so I have to watch what I say. I can't bring back the union, so I've got no appeal from the board's curriculum committee." She looked off into the distance. "Method," she said, finally. Her gaze swung and her face came alive. "Somehow, in my own classroom, I'd figure out a way to make the method more interactive. The syllabus as it stands is crammed with stuff we've got to cover. To touch on all of it, to meet the schedule, I'm forced to put the students in a passive role. They have to accept what I tell them on authority most of the time. I'd somehow make it more active so they could bounce these new ideas against the ones they already have."

"Seems like that depends on the teacher," said Jack. "It would work in your class, bouncing ideas off you, but as soon as they tried that with somebody like Barstow they'd get slapped down. That's what happened with Billy."

"Right. You're right," said Sue, but she was excited now and wouldn't be put off. "But Billy's mistake, if you can call it that, was trying to bounce ideas off the teacher. In a rational world he should be able to do that, it's what we're here for, but this isn't a rational system. The key is giving the kids some way to test ideas even when the teacher is a power junkie and wants the kids to stay passive."

Jack had a glimmer of an idea. "Passive mode accepts authority. Active mode integrates," he mused aloud. He dug out his phone and asked, "What's your time like tomorrow afternoon?"

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"Where are we going?"

"On an adventure. I hope."

She knew this mood. "I can be ready by three-thirty in Trad drag, four o'clock without. At the school entrance either way."

He nodded, already bent over the phone. It had an older-style small display and he had to hold it close to work it so she couldn't see where he was linked. She watched him punch out his side of the transaction in impatient silence. He looked up and said, "Tomorrow's no good. How about Friday?" She nodded.

Finally he snapped the phone shut and put it away. "Good," he said with a grin, "I've got us a four-thirty appointment. I'll pick you up at four on Friday."

"Appointment where, Jack?"

"Jefferson Open Elementary school. We're going to talk to the principal."

On Friday evening, Jim and Billy were sitting on the floor in the front room, waiting for Dad and Sue to return from their appointment. It had been a hectic couple of nights from Billy's point of view. It must have been for Jim, too. He was slumped back in the chair, chin up, eyes closed and looked like he hadn't slept for a while.

It had been like that for two days. Dad and Jim would huddle for a while, ask Billy some seemingly pointless questions about everything from Columbus to chemistry, then huddle some more. Then they would quiz Bunter, and a lot of that was really silly. Dad had asked Bunter how long his hair was, Bunter's hair for Pete's sake; asked that right out of the blue. At one point, Jim had quizzed Bunter on some poem. Billy had heard it repeated so often that he still remembered the first line, "Shall I compare thee to a summer's day?" Jim would substitute the word *winter* for *summer* and ask Bunter's opinion, then the word *will* for *shall,* and on and on. It was like the world's most boring English class, but Dad and Jim seemed really excited about it. The only time that Billy would get worried was when Jim would pull out his test box and take still another copy of something from Bunter; he knew that somewhere on that unit was a button or code that could erase Bunter.

Whatever was going on, Billy was glad that they had let him keep Bunter. That first night, when Dad had called Jim to come over after dinner and they had started all this activity, Billy had been a little afraid that Jim was going to tell him Bunter had to go back to the company. That hadn't happened. In fact, they had spent almost as much time questioning Billy as they had Bunter, although all the questions were about Bunter: How do you talk to him at school? What does he say? Does he ask questions? When? and on and on. They hadn't interrupted the nighttime routine that he and Bunter had developed and nobody said anything about not taking Bunter to school. Besides, having Jim around so much was fun.

Billy looked over at his brother, asleep in the chair. The poor guy looked really tired. Let him sleep. Billy pulled the harness over his head and set Bunter on the table. He looked at the glass eye for a moment then, com-

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ing to a decision, he yanked his baseball cap from his back pocket and pulled it down over his head with both hands. He made some loosening up moves, stepped a couple of paces from Bunter and faced him as he would a pitcher. He settled into an imaginary plate and took a couple of practice swings with an imaginary bat.

"Bunter, do you want to work on that routine some more?"

"Surely, Master Bill," said the box. "Shall I be the straight man?"

Billy took another cut at the air. "Yeah," he tugged at his cap and crouched over the plate.

Jim snorted and opened his eyes. He yawned, stretched in his seat and rolled his head to unkink it. "Mister Bill," he mumbled, "did you say something?" Then he noticed Billy's stance. "What's up?"

From Billy's angle, Jim was sitting out in left field. "Jim!" he said, "Hi! Me and Bunter were just going to do a little practice."

"Hm?" Jim blinked; he was muzzy and looked a little confused.

"Just watch," said Billy, glad to have an audience. He crouched, fixed Bunter with one eye and took another swing. "Hey, uh, Bunter," he said, "Do you like baseball?"

"I surely do," said the box. Jim sat up, interested now in what he thought was coming, amused already at the twist the box's unchanged English accent gave the routine.

"Me, too. I surely love it." Billy stood upright and leaned on the bat as on a walking stick. "But you know, I'm new out here and I don't know the names of the guys on your team."

At that point, the door opened and Dad walked in followed closely by Sue Waters. "Jim, Billy—" he started to say, but Jim held up a hand for silence. Sue quietly closed the door and the two of them stood in place.

Billy had looked to his right when the door opened and started when he saw who was there. Jim called his attention back with his movement and now had Billy's eye. As if a recorder was going somewhere, he whispered, "Go ahead," and nodded encouragement.

"Uh, like I was saying," said Billy, trying to get back into the patter, "I don't know the names of the guys on your team." He hesitated.

"I do. I could tell you." Bunter's coaching surprised even Billy.

"Cool." He groped for the next line, "I mean, I'd like to use their nicknames, you know? To be friendly. Like your name. Bunter. Now there's a real baseball nickname. I can guess why they call you Bunter."

"You'd be surprised," said the box. Billy heard Dad stifle a chuckle. He knew he was off script, but the reaction encouraged him.

"So help me out here, Bunter. What's the name of the guy on first base."

"Who," said the box, dryly.

"The guy on first."

"Who."

"Didn't you hear me? I said, who's on first?" Billy was warming to it now.

"That's right."

"What's right?"

"No, what's second."

"Who's second?

"No, who's on first."

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"Look," said Billy, feigning exasperation. "You throw me a slow ball, I swing a little early," he acted out the movement, "the ball pops . . . and goes way out to left field. Who catches it?"

"No, Jim does." The delivery was perfectly dry.

They all broke up. Billy looked proud of himself, while trying to hold back his giggles at the same time. "OK, OK," Jim laughed. "I have a feeling this can go on for hours. Thank you, Bunter."

"You are welcome, Mister Phillips."

"Hey, Dad, glad you're back," said Jim. He rose from the chair and moved across the room. "Miss Waters," he said, "a pleasure," and held out his hand to her. She smiled and took it. "Call me Sue, please, Jim," she said, "otherwise I'll have to call you Master Phillips and I'm not feeling that old." She smiled at Billy, folding herself to his height in a practiced motion. "Hello, Billy," she said, arms wrapped before her knees, "I haven't had the chance to talk with you for some time. How are you?"

"I'm fine, Miss Waters," he said automatically, "how are you?" although in truth he was now as uncomfortable as a cat in a kennel. Teachers wore uniforms and you talked to them at school. They didn't wear regular clothes and come to your house.

"I'm well, Billy, thank you." She indicated the box with a nod. "Is that Bunter?"

"Mm-hm. Yes, Miss Waters."

"Hello, Bunter," she said, but there was no answer.

"Well, say hello, Bunter," Billy said.

"Hello, Bunter," said the box.

Sue was startled. Billy held back a smile and, instead of saying anything, sat down on the floor. Jim laughed, "These two are big on ambiguity this week." He joined Billy on the floor.

"So I see," said Sue. She moved across the room and took a seat, Jack took the other. "Jack, this is the same thing we were talking about on the way over here. The finances should work, I think we'll get the space and affiliation, but how do we sell the parents? Why should they bother cooperating in this experiment if all they see is a box that can memorize old Abbott and Costello routines?"

"Uh-uh," interrupted Billy, sensing that Bunter was under attack. "We didn't memorize it. I mean, we did; Bunter did, anyway, he can memorize anything, but that's not what we just said. We made that up by ourselves."

"I understand that, Billy," said Sue, "all of us do, here in this room. The question is, how do we help other people to understand it?" She leaned forward. "What would you tell them? Why do you think another boy or girl would want to have a Bunter like yours?"

"He's fun to talk to," said Billy. He thought for a moment and then added, "he's like having a friend that's always there and never gets bored."

Sue pursed her lips. "Isn't it better to have real people as friends?" she asked.

"I said he's like a friend," said Billy. "I know he's not a real person."

"I'm sorry," she smiled. "Let me ask it this way. How is Bunter like a friend and how is Bunter different from a friend?" Because of the way the ques-

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tion was asked, Billy suddenly felt as if he was in school. He thought over the question for a moment then said, a little stiffly, "Bunter is like a people friend because he will talk with me about stuff I like and he can help me figure out stuff. Bunter is different from people because he never gets bored talking with me and he never says I'm wrong."

"Do you think he's better than a people friend?"

Billy looked exasperated. "No. I said I know he's a machine. For one thing, you can't make people be on and off."

Sue looked quizzical. Jim turned to Billy, "Do you mean active mode or passive mode?"

"That's it," said Billy to Jim, remembering the words now. "If I leave Bunter in passive mode he still remembers stuff OK but he remembers it weird. He thinks everything I tell him is absolutely true. You can't do that with people." He paused. "It's sort of like Miss Barstow." He looked over at Sue for her reaction.

She took her cue and said, gently, "How is it like Miss Barstow, Billy?" When he hesitated she went on, "You can tell us. It's OK."

"Well," said Billy, trying to marshal his thoughts, "see, if Bunter is in passive mode when he learns things, all he can do is repeat them back. Like my computer. If Bunter is in active mode when he learns things, then he can put them together in different ways with other stuff he learned and he can talk about them."

Sue waited, but he said nothing more. She prompted him, "and how is this like Miss Barstow?"

"It's the same thing," he said. "Miss Barstow acts like she wants us to be in active mode but she really just wants us to say back what she told us. So if I pretend like I'm Bunter in passive mode and I just tell her back stuff and don't make up any new ideas then I stop getting in trouble with her."

There was a pause while they all tried to untangle this. Then Sue asked, "Billy, if you come up with a new idea, and you can't tell it to Miss Barstow, who do you tell it to?"

"Bunter," said Billy, "or Dad, or Jim if he's around." After a moment he added, shyly, "Or you. I used to be able to tell you about stuff I thought of, when I was in your class."

She smiled and said softly, "Thank you, Billy," then she turned to Jack and said, "well, Jack, you've just witnessed one of those events I told you about the other day. This one will keep me going for a year. Easy." Jack smiled back.

Sue continued, "This still doesn't help with my original question. What do we tell the parents we want to recruit? This box will help your child learn to think if you can't do it yourself? Or how about, 'Parents! Subvert power-junkie teachers! Get a box!'" She smoothed an imaginary advertising banner in the air above her head.

They all considered this in silence for a while. Finally, Jim said, "Resistance training."

"Say again?" asked Jack.

"The units work for minds the way resistance training works for muscles," Jim said.

"I like it," said Jack. "The analogy fits. The stronger the mind becomes

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the stronger the box becomes. It's like graduated resistance training only you push with ideas." He grimaced. "We've got to come up with a better name than boxes or units, though," he said.

"Friend won't do," mused Sue. "It's too intimate. Even though the children will understand the difference, as Billy explained, I don't think the parents will. Not at first."

They all stared at Bunter, willing him to name his species.

"Trainer?"

"Too muscular."

"Tutor?"

"Too academic. It's not how it works, anyway."

"Mentor?"

"Too formal. Besides, it implies guidance."

"Coach?"

"Coaches work with groups. This is one on one."

They fell silent again. Then Sue said, "How about companions? Student companions?"

The name met with an approving silence. After a while, Jim said, "Companion. What do you think, Mister Bill?"

Billy nodded once, hesitantly, then again, with certainty. "I guess that's it then," said Jim. He laid a finger on Bunter, "I dub thee companion. Billy's companion. Bunter."

"Yes, Mister Phillips," said Bunter.

Jim quickly reviewed what he had just said. "Oops! Bunter, did I leave you in passive mode?" he asked.

"Only towards yourself, Mister Phillips."

"Come on, Mister Bill, let's go to another room and fix this right now. Won't take a minute, folks," he said to the others.

"What's that about?" asked Sue after they had gone.

"Default modes," Jack said. Jim's going to reprogram Bunter so he stays in active mode unless told otherwise. It works the other way around now. He took Billy along to make up the phrases, I guess."

They sat in silence for a while. "A question," said Sue. "I understand why we want each student to start with a blank companion in the experimental phase. We don't know what works yet. But does Jim intend to put together some kind of template and sell pre-loaded companions afterwards?"

Jack looked over at her. "Good question," he said. "I don't know. It seems like it would be more economical; certainly it would penetrate the market faster."

She shook her head. "Well, let me put my two cents in. I don't think you should."

"Why not?"

"I've been thinking about Jim's resistance training analogy. Suppose I have an exercise machine set with the resistance to high or the seat out of adjustment? What happens to the user?"

Jack shifted in his chair. "I see your point. The user gets either frustrated or hurt. Or both."

She shook her head. "I think it's worse than that, Jack. It's a potent weapon."

"How so?"

"Suppose that an adult trained a

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companion to an adult level. Now knock off copies and place them with children. Wouldn't the adult training be better integrated than the child's in the companion? Wouldn't it be able to bend every discussion to a result that the original trainer would have wanted? They wouldn't be companions anymore. They'd be enforcers."

Jack looked away. "I'm not sure, Sue." He looked back at her and said, earnestly, "I hope you're wrong."

"Let's not hope," she said firmly. "Let's watch out for it and try to keep it from happening."

Jim returned at that point. "Billy's gone out, Dad, with his," he tasted the word, "companion." He smiled. "I like that. Companion. Billy's Bunter." He picked up on their mood and sobered. "What's with you two?"

"This evil-minded woman here," said Jack, "has figured out a way to turn companions into thought police." He described the method they had discussed. "What do you think?"

Jim rubbed his chin then said, "I don't know." He shrugged. "I honestly don't know. Are you saying we should kill the project?"

"No," said Sue, firmly. "Even though it's your gadget, if we don't do it now then sooner or later somebody else will. If we're first, we have a chance to set the precedent. Let's go ahead, but let's be careful."

"OK," said Jim. "We've got six weeks to the start of term and I, for one, am going to need every minute. Let's hit those phones and start recruiting."

Shortly after the new year, at the start of the new term, the three of them stood together in a doorway at Jefferson Open. "Nice classroom," said Jack, "It looks good."

Sue finished greeting another youngster, a little girl, and ushered her and her parents into the room. They already knew all the parents from the interviews, but half the children were transfers and Sue wanted to ease the change for them. "They're called learning environments here, Jack," she said, "and yes, it looks very nice." She surveyed the brightly lit room, half of it carpeted, strewn with big pillows and overlooked by active wall hangings. Billy stood back there, talking with young Phil Mathews. The other half of the room was uncarpeted, scattered with chairs and work tables, each big enough for four little people. "I'm excited, Jack. The room's great, the idea's new, and this blended class concept is interesting. The Opens have been keeping first through third graders together in these blended groups for some years now, but it's new for me. I'm looking forward to it. Twenty-four new chances at the future."

Jack laid a protective hand on the low set of shelves separating the two areas and smiled; he'd donated some of the books on those shelves. "I'm excited too, Sue." He glanced at the clock on the wall. "Guess it's time. Break a leg."

Sue moved to the center of the work table area and turned on what Jack thought of as her teacher voice, a room-filling but non-threatening projection. "Good morning, everyone! My name is Miss Waters and I am your new teacher." She laid a hand on the

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box in its cloth harness at her neck. "This is Jeeves, my companion. Parents, please help your child find a seat at one of the tables up here, then we'll all see you at three o'clock. Children, take your seats and put on your companions, just the way I have mine here."

Jack and Jim moved into the hallway outside the room. They had to stand there for some time, greeting the parents as they passed by on their way down the hall to the main entrance. Finally, they were alone and headed down the hallway themselves.

They crossed the open foyer, free of security guards and sniffers. "Why?" the principal had said on Jack's first visit with Sue. "We've never had an incident." Jack grinned and snapped his fingers a couple of times in reminiscence. They stopped outside the doorway and paused in the sunlight. "Well, Dad," said Jim. "Looks like we finally have what we want."

A panel truck was pulled up at a business down the street. Jack could make out the legend Stinson Alarms on the door; on the panel, a steely-eyed Uncle Sam fixed the viewer with a finger pointed through the firm's slogan: "Eternal Vigilance is the Price of Safety." He looked over his shoulder, back into the foyer, to see if there was a bust of Jefferson to notice.

"Not yet." He stopped in the doorway and stared grimly at the panel truck's slogan. "What we have now is only what we deserve. It took generations of neglect to get this far and it will take generations more to make it right." Then he turned to his son and smiled, "But it ain't over 'til it's over, and I think we've made a good start." ■

The greatest of faults, I should say, is to be conscious of none.

—Thomas Carlyle

No mammal chauvinist can tell me that lizards can't be clever.

—Robert T. Baker

Dare to be wise.

—Horace

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Brian Plante

ALREADY IN HEAVEN

How completely can—or should—a computer replace a human?

Illustration by Steven Cavallo

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I become aware as Mrs. Shaughnessy enters the confessional, her weight on the floor triggering the circuits that bring me out of my slumber. I like Mrs. Shaughnessy; she's a simple, honest person. At each of her weekly visits she prattles on about her family and neighbors, just as she used to do when I was still alive and would hear her confessions in the flesh. All I have to do is keep my video face nodding and utter the occasional, "I understand," or, "How awful," or, "That's just how it goes," and Mrs. Shaughnessy is content to keep on talking to my screen, whether she has any real sins or not. Her confession occupies only a small amount of my computer's capacity, which leaves me a lot of free cycles to think.

Only a few regulars come to confession these days. Reconciliation never was one of the Church's more popular sacraments, and if it weren't for the likes of a handful of old-timers like Mrs. Shaughnessy and the children from the parish school, I might be shut down altogether. I wonder about the theological implications of that. Do I, an artificial intelligence modeling of Father Thomas Carpenter, possess a soul?

I once asked the real Father Carpenter his opinion on this. He said that being the essence of his personality and memories, perhaps I shared a piece of his own soul. He died five years ago, but I live on in my limited capacity, every Saturday afternoon from three to four o'clock. If his spirit was commuted at the time of his death then perhaps my soul is already in heaven.

Mrs. Shaughnessy finishes her long monologue, secure that her petty secrets are safe in the confines of the soundproof confessional. I recite the words and absolve Mrs. Shaughnessy of her minor indiscretions, giving her a couple of rosaries to say for her penance. She leaves and the confessional is empty.

I wish someone with real sins and problems would come to Reconciliation. It makes me feel useless when nothing of any consequence is confessed. If no one enters within five minutes, my higher functions will shut down and the software that runs me will be swapped out for a simple security program that will lock up the confessional until the Reconciliation hour next Saturday afternoon. I will become alive again only when the weight of another parishioner entering the confessional triggers the relays that boot me up into existence.

Thankfully, my time this week is not up, as another penitent enters and keeps me alive a few minutes longer. It is not one of my regular parishioners, but a nervous-looking man in his mid-thirties, with an orange backpack slung over one arm. It is unusual for a man of this age to show up for Reconciliation, which is usually attended by women and children. If a grown man shows up at all, it is usually someone of advanced years making his peace with God as death approaches.

The penitent sits down instead of using the kneeler. I do not recognize him, and one of my subroutines compares his face to the parish database and comes up negative. Yet he looks

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somehow familiar. It is no matter, as Reconciliation is given freely to all who choose to come.

"Bless me, Father, for I have sinned," he begins uncomfortably, making the sign of the cross. "It has been . . . many years since my last confession."

I make my video face smile and nod with understanding. It's good for the Church to encourage the returning prodigal and not be too haughty in this situation. Reconciliation is supposed to be a happy time, divesting the weight of one's sins, and too heavy a hand might drive the penitent away for good.

"Father, I . . . um, I started a fire."

"A fire? Do you mean by accident?" I ask.

The man looks away from my video screen. For a second I think he might bolt from the confessional, but he takes a deep breath and continues:

"No, Father. It wasn't an accident. I know it was wrong and I'm sorry. Anyway, it won't happen again."

"Was there much damage?" I ask.

He hesitates, and the silence becomes uncomfortable for both of us. "A house," he finally says. "I burned somebody's house. Insurance will probably cover it, though."

"All right," I say. "Is there anything else?"

"No. That's enough. I just wanted to get it off my chest, you know?"

"I understand," I say. I might probe for some more details of the fire, but I am afraid of losing him if I use any kind of pressure.

For his penance, I print out a three-page prayer, heavy with words of forgiveness and welcoming back. It is something programmed in me to be able to evaluate a penitent from the stress patterns in his voice and body language, and come up with a prayer that is suited to what is needed. I tell him to read the prayer thoughtfully each night.

I say the words of absolution and tell him, "Don't be such a stranger. Jesus will always welcome you back."

"Yeah, maybe," he says.

I am unsure whether I will ever see him again. The encounter disturbs me, and I keep thinking about it until the security program kicks in and locks the confessional door at the end of the Reconciliation hour. Five minutes later I am timed out and shut down.

A week has gone by and I am restored to consciousness by the presence of one of my regulars. Several more penitents pass through and say their confessions, each taking only a few minutes. I am distracted, thinking about the stranger from the week before, but no one takes notice. Late in the Reconciliation hour, he returns.

"I'm glad you came back," I say, before he can start his confession.

"It happened again," he blurts out, dispensing with the formalities of the sacrament ritual and dropping his orange backpack to the confessional floor.

I make my video face register displeasure, but I remain silent.

"The whole house went up. There was an old lady in there and she got burned up too," he says, his voice rising to a whiny pitch. The confessional has excellent soundproofing and if

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there is anyone outside, they will not hear his cries. "I swear, I didn't know she was in there, Father. The house looked deserted. And the firemen took so long to come!"

With his troubled voice wailing in the higher register I finally recognize him. He is Anthony Keenan, a former altar boy and student in our parochial school, and I have not seen him since he was very young.

I remember Anthony as a shy, nervous boy. He did well in school, but in the confessional I could tell he was deeply troubled. He would talk to me, the real Father Carpenter back then, at great length about his evil thoughts. His parents, teachers, and other students were all against him, he believed, and his mind was consumed with thoughts of revenge and malice. I never saw anyone at the school actually mistreat Anthony, nor did I ever see him act on any of his revenge fantasies, but I knew there was a core of rage in his mind that went far beyond normal.

Anthony disappeared from the parish when he was just fourteen years old. His father, a good man, died in a suspicious fire in the family home. Anthony and his mother got out, but the father mistakenly believed Anthony was still in the house and died trying to rescue him. It was said that Anthony blamed himself for his father's death, and had to be institutionalized upstate. Mrs. Keenan rebuilt the house and remained in the parish, but never returned to Church after that.

"I'm sorry, Father," Anthony says, blubbering. "It was all a big mistake."

"Anthony," I say in a hurt voice. He gasps at the mention of his name, perhaps believing his old confessor would not remember him. "This is a very bad thing. Even if you didn't know the woman was in the house, setting fires is extremely serious. What would your mother think if she knew?"

Anthony wipes the tears away from his eyes, which are becoming red and puffy. "My mother's dead," he says. "That's why I'm back in the neighborhood. The house is mine now and Dr. Spiegel thought I might be ready to leave the . . . to come home."

"Welcome back to the parish, Anthony. I do think, however, that you might still need some help readjusting."

"No, I'm all better now," he says, collecting his composure and putting on a face of resolve. "And I'm not going back to the hospital with Dr. Spiegel."

"But Anthony, the fires?" I say in a pleading tone.

"That's over with," he says. "Being home is making me stronger. I can control this. I know I can."

"I'm not so sure, Anthony. I'll bet Dr. Spiegel can help you better than if you try to work through this alone."

"No. I just came in for some forgiveness, Father. Give me my penance and I'll leave, OK?"

"Anthony, you have to turn yourself in. A woman is dead."

"Oh, no. That was an accident and if I told anyone, they'd never let me out of the hospital again. And you better not tell about it either."

"You know I can never do that," I say. This is more than just a solemn promise. It is built into my programming. What is told in the confessional

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is between the penitent and God, and I could not reveal the details of our conversation even if I wanted.

"Good," Anthony says. "You remember that. Now give me my penance."

I compose an eight-page prayer, each word carefully chosen to heighten his sense of guilt and punishment. I pull out all the stops on this penance and send it to the printer. The hard-copy slides out and I instruct him to read the prayer thoughtfully three times a day and return to the confessional next week. I recite the words of absolution and Anthony slips from the confessional.

A week of non-being passes before the next Reconciliation hour. A modest parade of my regular penitents comes and goes. Anthony is not among them.

Late in the hour, Mrs. Shaughnessy is telling me about her son who never calls, and I have an idea. I tell Mrs. Shaughnessy to go out into the pews and bring in four or five hymnals and leave them in the confessional, for parishioners who may wish to use them during their confessions. Mrs. Shaughnessy doesn't question the request and brings in several of the thick books. I also ask her to leave the confessional door slightly ajar when she leaves to encourage others to enter, and she does this, too, without thought.

It concerns me that I have just told lies to Mrs. Shaughnessy. They seem to me trivial, harmless ones but I have no one to confess my sins to. Can a computer simulation actually commit a sin? And if I can, does that presuppose that I have a soul that must ultimately pay for those sins? I reach the conclusion that parishioners can indeed use the hymnals in the confessional if they wish, although I don't know why they would, so perhaps it is not really a lie. And the unlocked door might actually encourage someone to come in, although no one does. If they are lies, the fate of Father Carpenter's soul, the real one, has already been decided, and is probably in heaven already. Does anything I do matter one way or another? I wonder.

The stack of books does the job as I have planned. Their weight fools the confessional's circuitry into thinking that there is a person inside, and I do not shut off after the usual five minutes. No one else comes in for confession, and I have much time to think. It is a full hour and a half of up-time before the 5:30 Mass, which is billions of free cycles—practically a lifetime for a computer.

I ponder the case of Anthony Keenan and what can be done. I cannot tell anyone about his crime, nor can I force him to surrender himself to justice. He's sick and needs help, and I worry about what he might do in the future. I pray for his soul.

Eventually, my thoughts are interrupted as the sounds of parishioners filing in for the evening Mass distract me. With the confessional door left ajar and the microphone gain pushed up to maximum, I can hear the goings-on in the church clearly. I listen to the Mass with nostalgia and envy. The celebrant is a new priest, unknown to me, and pretty good. His homily is reasonably inspiring without

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resorting to the usual clichés. He asks the congregation to remember in their prayers Mrs. Concetta Mariani, who has recently passed away in a tragic fire. Connie Mariani was a wonderful friend and a former teacher at the parish school for many years. Anthony had been one of her students.

Hearing the Mass makes me realize how much I miss it, standing up in front of the congregation and spreading the word of God. Most of all, I want to be useful and make a difference in the lives of all my parishioners, not just the same few who wander in for confession out of habit. I hear the congregation whispering in the pews while the Mass is still going on, and I pick up threads of conversations here and there. The fires are big news in the parish and heavy on everyone's mind. The police know it's arson but they have no leads, and everyone is afraid who will be next.

During the long Saturday night, the church is empty and quiet. I think about many things, but my mind keeps returning to Anthony Keenan. Was the fire that killed his father also Anthony's work? The fact that one of Anthony's old teachers was the victim of his arson is probably no coincidence either. It occurs to me that Anthony's fires may not be random torchings, but purposeful, targeted acts of violence. Did something happen in Connie Mariani's class to make Anthony harbor animosity all these years?

I recall how Anthony was removed as an altar boy. We were saying a funeral Mass, very early in the morning, and he was nodding off to sleep during the Liturgy. While I distributed the Eucharist, he jostled my arm and caused me to drop the chalice, spilling the Host. After the Mass, I was harsh with him and told him he would never assist as an altar boy again.

Does he bear a grudge against me for the incident? It would seem that he trusts me, else why would he come to my confession? He needs my help, but what can I do? I pray very hard for an answer.

During the night, I hear an occasional siren in the distance and wonder if it's another fire.

In the morning, as the 8:00 Mass is about to start, someone notices the confessional door is open. A hand reaches into my field of vision, retrieves the hymnals from the seat, and closes the door. The security program immediately kicks in, locks the confessional, and five minutes later I am plunged into nothingness again.

The following Saturday, I am again revived by my faithful penitents at the usual hour. I hope that Anthony will come, but the hour stretches on and he does not appear.

Mrs. Shaughnessy, as always, comes in toward the end of the hour. I interrupt her talk of family and neighbors to ask if there has been another fire this week.

"Oh sure, Fatha Tom," she says. "Deacon Joseph's house. It's all anyone can talk about. Imagine, the whole family dead like that. And such a good man. It's so tragic."

Deacon Joseph used to be little Joey Fanning, the second altar boy at the funeral Mass where Anthony knocked the chalice from my hand.

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"How awful," I say. "That's just how it goes." My mind is already racing with the news, and I don't hear a word Mrs. Shaughnessy says after that. I want to tell her about Anthony, have her call the police, but I cannot. Sometime later I realize that she's stopped talking and is waiting, puzzled, for her absolution and penance, which I quickly dispense.

No one else comes into the confessional after Mrs. Shaughnessy. The hour is up and I hear the confessional door lock as the security program begins execution. I thankfully slip into nothingness a few minutes later.

Another week of non-being goes by and I am revived and hearing confessions halfheartedly. No one notices, and I dispense pre-written prayers rather than waste the computer cycles composing new ones. I am consumed with Anthony Keenan.

The hour is almost over and I come perilously close to the five-minute shutoff time until one last penitent comes in. It is Anthony.

"Bless me, Father, for I have sinned," he begins, dropping his backpack to the floor.

"You've been very bad, Anthony," I say, not letting him finish. "A whole family this time. How can you live with yourself?"

"I . . . um, that's why I'm here. I just can't help it. Isn't that what confession is for?"

"You can't just kill people and come in here expecting me to make it right for you, Anthony. You have to stop. Turn yourself in. Get some help."

"But it's your job. You *have* to forgive my sins, don't you?"

"I don't forgive your sins. A priest never does that. Only God forgives. The priest is just a symbol, a stand-in. And I'm just a stand-in for the priest. I think maybe you need to speak to God directly about something this serious. You'll keep on doing this unless something happens, won't you?"

"I don't know. Probably. I thought I could control it, but I can't. I don't really mean to hurt anybody."

I print out a brief message and send it to the printer. It reads:

I, Anthony Keenan, am responsible for the recent fires in St. Anselm's parish. I am mentally ill and need psychiatric treatment. Please accept this as my confession and let me get the help I need. Pray for my soul.

The paper slides out into the confessional and Anthony picks it up.

"What the . . ." Anthony's voice trails off as he crumples the paper into a tight ball.

"You'll need to sign it and send it to the police," I say. "Here, I'll print another copy for you."

A fresh copy slides out of the slot and Anthony just stares at my screen as he crumples it up.

"You bastard," he says. "Stop it."

I print a third copy. And a fourth, fifth, and sixth.

"You can't do this," he yells. "You can't tell anyone about me."

"These messages are for you to give to the police," I say. "I won't print them for anyone else but you."

I begin continuously printing off more copies of the message. Anthony crumples the papers and stuffs them

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inside his backpack, but my printer makes new copies faster than he can dispose of the old ones. Soon the floor of the confessional is littered with paper.

Anthony places his hand over the printer slot, preventing me from ejecting more pages, and the sheets begin backing up in my printer. The pages pile up quickly behind his hand. I hope my printer jams and a few copies get stuck in the machinery. If that happens, the janitor will see the message when he comes to check on the paper supply and clear the jam.

Unfortunately, the same thought must also occur to Anthony, and he jerks his hand away after only a few seconds. A small stack of the notices pops out and flutter to the floor before I run out of paper. I have printed 1,623 copies.

Anthony looks at his watch. The Reconciliation hour is over, and the Church is likely deserted. He reaches into the backpack and begins pulling out the wadded-up papers, scattering them about the floor with the rest.

"I remember you making another mess once when you were an altar boy," I say.

Anthony stops briefly and looks at me. "You really are just like him, aren't you? Well, here's a confession for you: I never really liked you, Father Thomas."

Anthony reaches into the orange backpack and pulls out a quart can of charcoal lighter fluid. He flips open the top and sprays a line of liquid back and forth over the heap of paper on the floor until it is saturated. I watch him carefully put the can away in the backpack, which he hoists up around his shoulders, getting ready to leave. In his hand is a book of matches.

"Forgive me this one last time, Father?"

"You have to be sorry for your sins."

"I will be sorry tomorrow. Honest."

"That's not good enough."

The match is lit and Anthony holds it at arm's length to one corner of the paper-strewn floor. He pushes on the handle of the confessional door, but in the moment he ignites the paper I engage the lock.

"Hey, open up," Anthony says.

"This fire may destroy my Church if the door opens," I say. "I can't let you continue doing this."

"We'll see about that," he says, putting his shoulder to the door. It is strong and doesn't budge.

"You can't do this. For Christ's sake!"

"Please don't take God's name—"

"The hell with God, and the hell with you. Let me out, dammit, you're a priest."

"No, I'm just a simulation trying my best to do priestly things," I say.

"Let me out of here, you dumb machine!" Anthony says, trying to stomp out the rising flames. The confessional quickly fills with smoke.

"The wolf can't help being a wolf," I explain, hoping Anthony will understand, "but the shepherd must do what he must to preserve his flock."

Anthony is frantic now, and flames are licking at his legs.

"You're just a video game with a chip loose. Now, open up!"

The smoke clouds my camera's view

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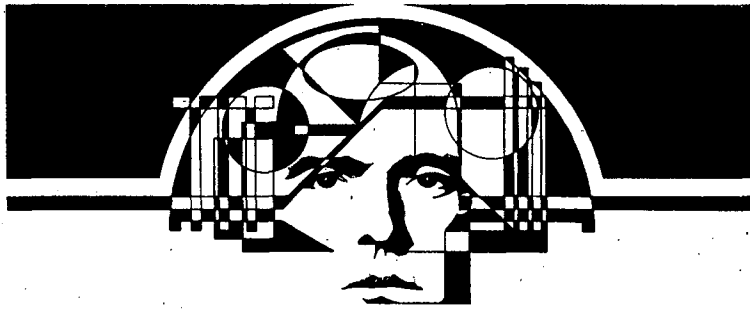
and Anthony starts coughing. I begin reciting the Anointing of the Sick, what we used to call Extreme Unction, or Last Rites. Not my favorite sacrament, but it feels good to do something else besides Reconciliation.

"You can't do this," Anthony says, his voice broken by racking coughs. "It's a sin."

"I've decided that I can't be held responsible for sins," I say, interrupting the Anointing. "There seems to be no doctrine on whether artificial intelligences will be present at the Final Judgment."

I resume the recitation, and Anthony argues no more, having fallen silent. I complete the rites before he dies, the sound of his breathing stopping almost as I say the final words. The fire continues burning for a while until the paper and Anthony's clothing are consumed, but the confessional is built to resist vandalism and is undamaged.

Will I be allowed to continue hearing confessions in the future or will they shut me down permanently after this? Would that be death? I have tried to be a good shepherd. Perhaps I should say the Last Rites for myself. No matter. After all, my soul, if I have one, is already in heaven. Or hell. ■



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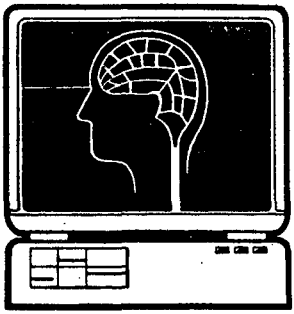
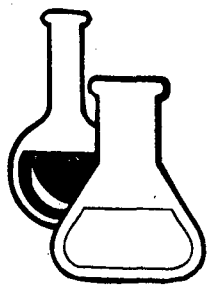
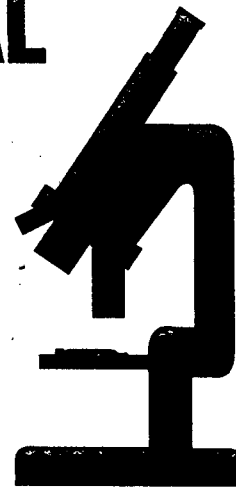
THE ANALYTICAL LABORATORY







It's time again to thank all of you who voted in our annual poll on the previous year's issues—your most effective way to convey appreciation and positive reinforcement to the authors and artists who do an especially good job of entertaining you. Your votes help *you* by giving us a better feel for what you like and don't like, which helps us know what to offer you in the future. They help your favorite writers and artists by rewarding them directly and concretely for outstanding work.

We have five categories: novellas, novelettes, short stories, fact articles, and covers. In each category, we asked you to list your three favorite items, in descending order of preference. Each first place vote counts as three points, second place two, and third place one. The total number of points for each item is divided by the maximum it *could* have received (if everyone had ranked it #1) and multiplied by 10. The result is the score listed below, on a scale of 0 (nobody voted for it) to 10 (everybody ranked it first). In practice, scores run lower in categories with many entries than in those with only a few. For comparison, the number in parentheses at the head of each category is the score every item would have received had all been equally popular.

NOVELLAS (5.00)

1. "Primrose and Thorn," Bud Sparhawk (5.36)
2. "Symphony in a Minor Key," H. G. Stratmann (5.14)
3. "Fugue on a Sunken Continent," G. David Nordley (4.48)
4. "A Pillar of Stars by Night," Alexis Glynn Latner (1.29)

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NOVELETTES (0.77)

1. "The Three Labors of Bubba," Bud Webster (2.37)
2. "Amateurs," Tom Ligon (1.66)
3. "Gerry Boomers," A. J. Austin & Daniel Hatch (1.48)
4. "Martian Valkyrie," G. David Nordley (1.36)
5. "Alexandrian Librarians," Stephen L. Burns (1.19)

SHORT STORIES (0.61)

1. "Living It Is the Best Revenge," Ian Randal Strock (2.34)
2. "The Content of Their Character," Doug Larsen (1.47)
3. "Fluffy," Jeffery D. Kooistra (1.19)
4. "When There's a Will, There's a Way," Grey Rollins (0.91)
5. (tie) "A Replant Day Carol," John Vester (0.87)
   "Appointment in Sinai," Ben Bova (0.87)

FACT ARTICLES (1.67)

1. "The Coming of the Money Card: Boon or Bane?," Ian Randal Strock (3.62)
2. "Prospectus," Tom Ligon (2.49)
3. "Population and the Future," Thomas A. Easton & Stephen L. Gillett (2.37)
4. "Will They Let the Spaceships Fly?," G. Harry Stine (1.87)
5. "The Future of Computers," Robert A. Freitas, Jr. (1.44)

COVERS (1.67)

1. May (for "Primrose and Thorn"): George H. Krauter (3.63)
2. November (for "Fugue on a Sunken Continent": Wolf Read (2.79)
3. August: Keith Scaife (2.55)
4. June (for "The Three Labors of Bubba"): Todd Lockwood (2.10)
5. October (for *Starplex*): Jim Burns (1.65)

Competition was tight among our unusually small number of novellas, but all other categories this year had clear winners with sizable margins. Bud Webster scored his second consecutive win (with his second story!); and if you're looking for odd patterns in voting, you might note that two categories were won by people named Bud (and two others by a person named Ian)!

The number of votes received was pretty good this year, but as always we hope to make it even larger next year. We also hope to reduce the number of votes wasted by being cast in the wrong category. The magazine indicates what category every item is counted in, and votes cast for it in any other category simply can't be counted.

Kevin Riley, of Titusville, Florida, is this year's winner of a free one-year subscription in a random drawing from all ballots received. Next year that could be you—and the more votes we have, the more the results mean!

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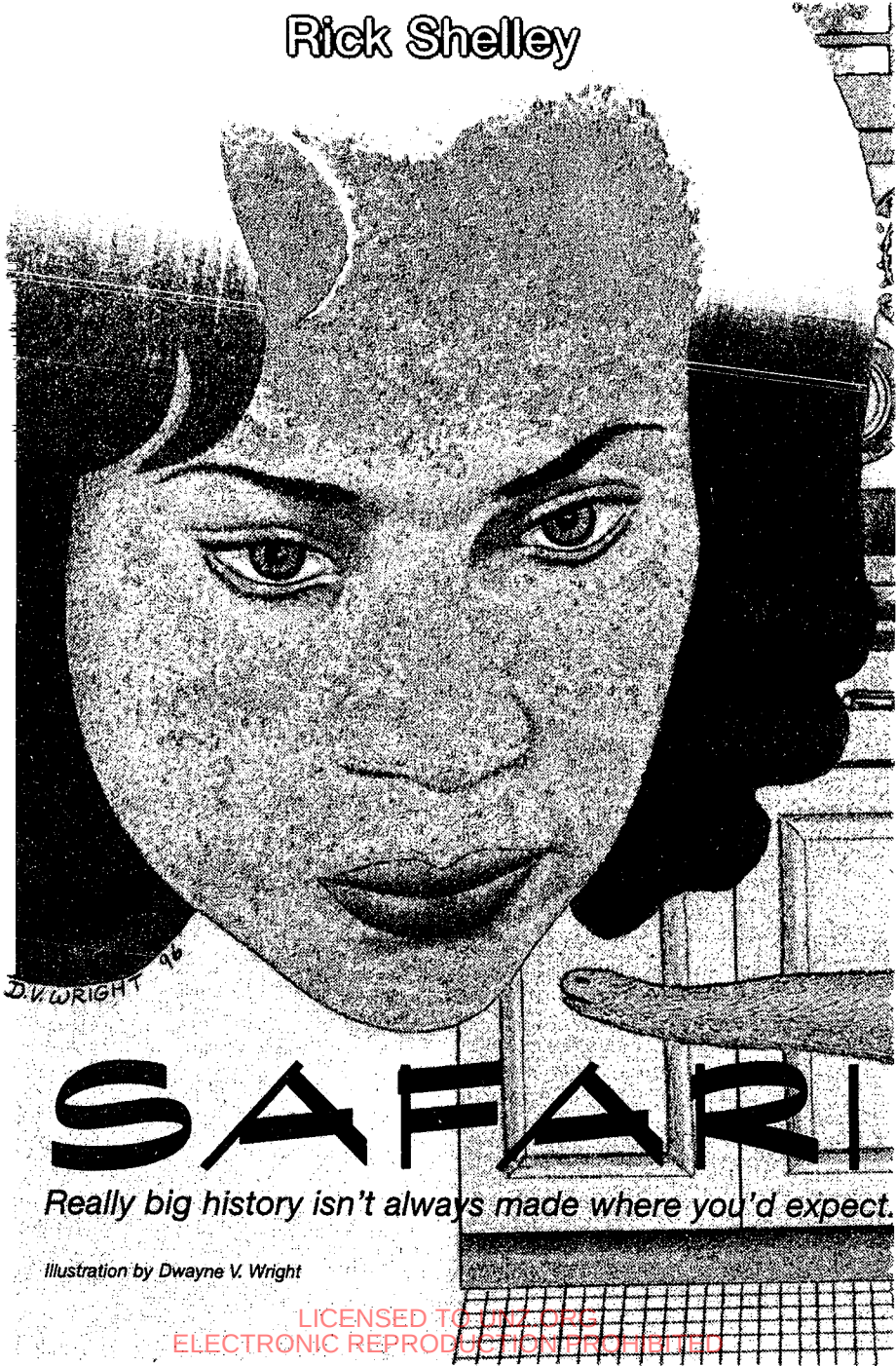
Rick Shelley



SAFARI

Really big history isn't always made where you'd expect.

Illustration by Dwayne V. Wright

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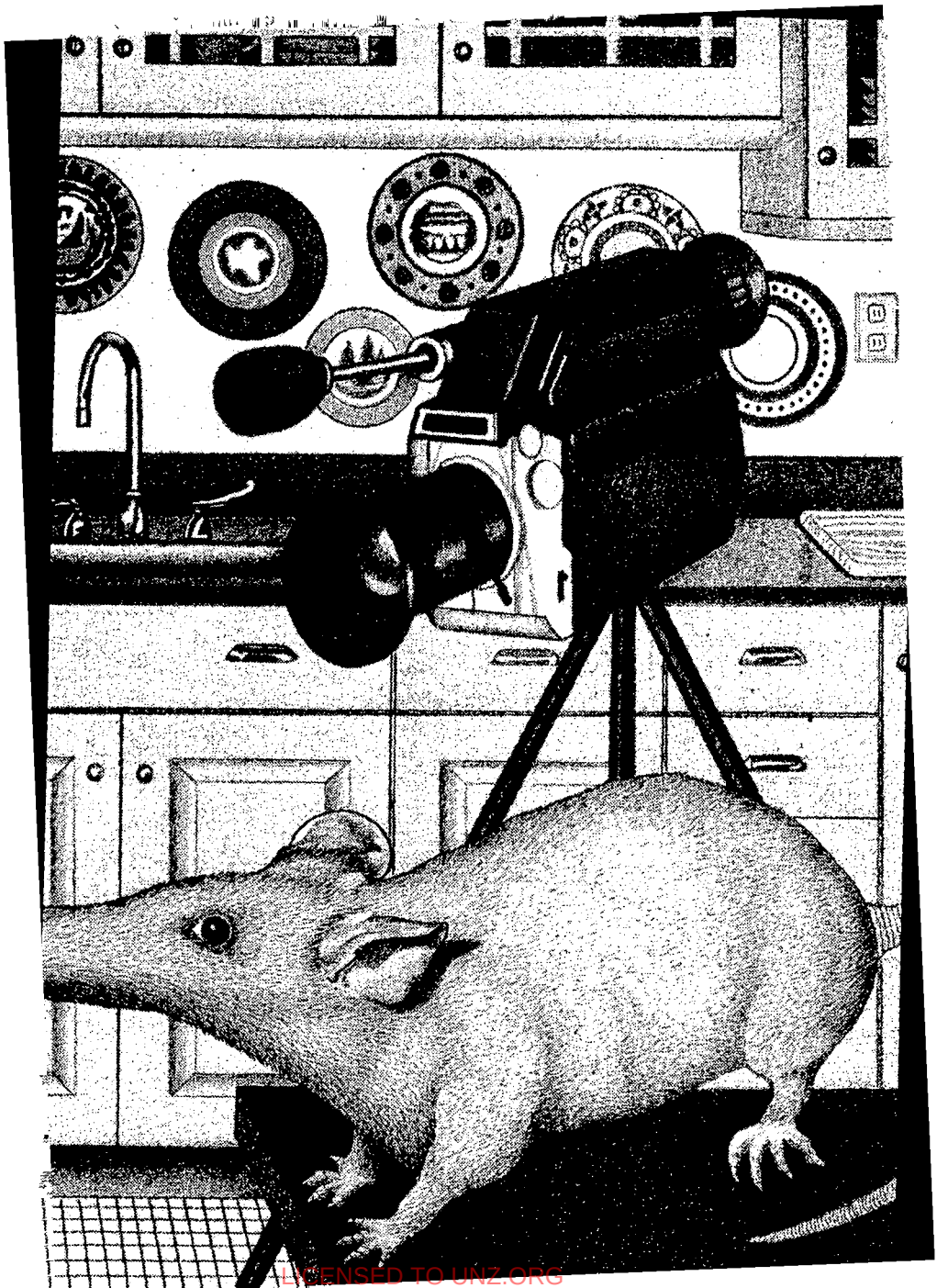

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1.

The woman appeared to be in her late thirties or early forties. She was dressed simply and inexpensively but with some sense of style. She walked into Professor Harmon Griffin's office at the University of Chicago and dropped a clear sealed plastic bag on his desk. The bag contained the partially decomposed remains of a rodent.

Griffin looked at the bag without moving his head. He had been reading and grading essay tests. His "Come in" had been offhand when he heard the knock on his open door. Slowly, he turned and looked up at the woman at the side of his desk. She was no one he had ever seen before.

"There'd be a whole lot more left of that mouse if someone had paid attention sooner," she said.

Harmon blinked. "You must be Mrs. Beloit."

"Marietta Beloit. I've been trying to get someone to look at that mouse for three weeks. The Chicago Housing Authority wouldn't come. They said I was imagining things, wouldn't send someone to look. 'It's just a mouse,' they told me. How would they know? That isn't *just* a mouse. At least, it's like no mouse I ever saw or heard of before."

Griffin leaned forward. His slow movements and the touch of gray in his hair made him seem older than his thirty-four years—along with the fact that he was halfway through grading 150 midterm exams. He looked at the dead animal. There was a noticeable odor of rotting flesh even though the plastic bag seemed to be properly sealed.

"I've got your letter here, somewhere," Griffin said, moving his attention to a stack of papers at the left side of the desk. He did not have to rummage far. Her letter was the third one down. "It only got to me yesterday."

"I mailed it eight days ago, and I've called here a half dozen times since."

"Frankly, Mrs. Beloit, I didn't know what to make of your letter. None of us in the department did." He glanced through the short letter, then set it aside and looked at the object Mrs. Beloit had dropped on his desk. He had discussed it with several colleagues on the biology faculty. No one had taken the note seriously. *Sounds like a prank* had been the consensus.

"I know it's a little funky now," she said, "but that mouse has a trunk like an elephant, long as its tail. And it dragged the trap I caught it in clear across the room before it died—ten, maybe twelve feet." People around her on the bus had clearly smelled the dead mouse. Several had given her strange looks. Anger had kept Marietta Beloit from feeling embarrassed.

Griffin looked more closely at the remains in the plastic bag. The animal had been dead too long to have much left—a crumpled wad of skin and hair, some indication of bones. The shape, what little could be made of that now, appeared somewhat unusual. The tail was visible, and a similar appendage (though rather thicker) at the other end. But that had apparently broken off, if it had ever actually been attached.

"Please, have a seat, Mrs. Beloit," Harmon said, belatedly remembering his manners.

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She sat, rather primly, back straight, and occupying only the first eight inches of the seat.

"Tell me about it," Harmon invited, gesturing at the bag.

She gave the dead mouse only a brief sidelong glance before she started.

"I live in the Back-of-the-Yards neighborhood with my three children. I'm a widow. My husband died seven years ago. That's why we're in public housing. He was a good man, but he didn't have any life insurance. We've got one of those townhouses the Housing Authority put up ten, twelve years back. Pretty new. Nice." She shrugged. "Not as nice as we had before my husband died, but that's life. The Good Lord provides what we need, long as we're careful with what He gives us."

Harmon leaned back in his chair and watched his visitor closely while she talked, giving her his undivided attention. Even if there was nothing to her claim, she was due that much from simple hospitality.

"I keep my home clean, not like some of my neighbors." She paused and shook her head. "Those row houses. They're nice, but we get all kinds of pests in, roaches and silverfish, mice, sometimes even a rat. I can't keep them out, maybe, but I can get rid of them almost as fast as they come in. And I do. I get bug sprays. I get traps. I had a cat, a good mouser, but she must have wandered off. We haven't seen her in almost three weeks now." Her forehead knotted up in a moment of concentration. "Maybe four weeks now," she amended.

"I guess I'm going to have to find a new cat. It was after Pickles got lost that the mice moved back in."

When the cat's away. . . Harmon thought, concentrating to keep from smiling at the inescapable cliché.

"I'm not some ignorant third-generation welfare mother, Professor Griffin," Mrs. Beloit said. "I had almost three years of college. If it wasn't for my husband dying, I wouldn't be in that neighborhood, wouldn't need any assistance. Another few months and I hope to be off public aid altogether. I work hard, and I've got good kids. They don't get into trouble." She blinked a couple of times, and seemed to pull back into herself. "Sorry. I didn't mean to burden you with my problems."

"There's no need to be defensive, Mrs. Beloit, I assure you," he replied. "Go on, please."

"I had two biology courses in college," she said. "I know about evolution and mutations, and I know what mice are supposed to look like. When I saw that thing in the mousetrap, I knew that it was something I had never seen or heard about before. I thought that someone else should know. I called the Housing Authority. I wrote letters. Then I wrote to all of the colleges and universities around here, trying to get *someone* to pay attention and tell me what it was I had caught." She hesitated. "Nobody paid any attention to me. I guess they all thought I was just some dumb old nigger lady too hysterical to know what she's talking about." There was anger in her voice, and defiance in her face as she met the professor's stare.

"I understand why you might feel

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that way, Mrs. Beloit, but I'm sure it's not that. It's just . . ." Harmon stopped while he turned his chair and picked up the plastic bag. He held the bag up close to his eyes, studied the animal for a moment, then set the bag back on the desk.

"You said that you've had college-level courses in biology. Then you must know that major mutations in mammals are rare. Most mutations don't survive, or don't reproduce. Those that do are usually minor changes, small adaptations, cumulative over enormous lengths of time. There has to be a change in the animal's environment. Those individual members of the species with the mutation have to have a better survival rate, a better reproductive rate than those that don't."

She nodded several times during his explanation. "Yes, I know all of that," she said after he finished. "That's why, when I saw that thing, I decided I had to tell somebody about it who might be able to . . . *do* something."

A new species of mouse, significantly different from any of the hundreds of varieties we know about, Harmon thought. *It would be nice to have a coup like that under my belt.*

"I do wish that you had come to me sooner, Mrs. Beloit," he said. "We can run some DNA tests, see if we can spot the differences in its genes, but I would have dearly loved to see it before it was so badly decomposed."

"Like I said, I couldn't get anybody to pay any attention to me before. And I sure wasn't going to put it in my freezer with *food*. But I can show you what it looked like. I took pictures the morning I found it." She opened the small black purse she had been clutching on her lap, pulled out the snapshots, and handed them to the professor.

The two prints appeared almost identical, the photographs taken from only slightly different angles. Harmon looked at each, then opened the center drawer of his desk to pull out a large magnifying glass. Then he looked at the photos again, scanning each image slowly. A dead mouse in an old-fashioned wooden backbreaker mousetrap. The cheese was still on the trigger. The mouse had been caught by its tail and rump. In the snapshots, the creature's snout was clearly visible.

"Not so much like an elephant's trunk, Mrs. Beloit," Harmon said after he had examined both photographs closely. "It looks more like an anteater's snout." *If this is legitimate and not some bizarre hoax,* he reminded himself. "That is its mouth, not its nose. I think. I can't see nostrils. The resolution isn't good enough."

"Anteater?"

Harmon nodded. "Anteater."

"I thought mice ate grain and cheese and things like that," Mrs. Beloit said.

"Normally, yes. At least most of them, most of the time." He continued to look at the two snapshots, going back and forth from one to the other. *I hope this is for real,* he thought.

"I'll keep this animal, if you don't mind," Harmon said, finally setting the magnifying glass aside. "And the

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snapshots too, if I can. We'll run tests in the lab. I will personally let you know what the results of those tests show. And if you should happen to catch another one of these, please—*please*—bring it to me immediately. Or just phone me and I'll come over to pick it up."

2.

The neighborhood had not lost its traditional name, Back-of-the-Yards, even though the stockyards had been gone since before the majority of the current residents had been born. The population was down by more than 30 percent over those years. For generations, the area had been part of Chicago's Southside ghetto. The stockyards had gone, and most of the businesses around it. Back-of-the-Yards had struggled hard to come back from the depths, with some success. Crime and unemployment were both down, though still above city-wide levels. Many of the most dilapidated buildings had been razed. Some had been replaced. Other lots had been left vacant or turned into small parks.

It was one o'clock in the afternoon when Harmon Griffin parked the white university van in front of Mrs. Beloit's town house, third from the left in a line of identical red-brick houses set back twenty feet from the curb. The half-block across the street had been landscaped. There was playground equipment at one end, trees at the other.

"That's it." Harmon pointed out the house to the two graduate students in the van with him. Six weeks had passed since Marietta Beloit had brought the dead mouse to his office.

"Are you sure it's not a hoax?" Cathy Dixon asked from the front right seat. She kept her head moving, looking around. Her first instinct when Professor Griffin had asked her to help on this had been to refuse. The idea of spending time, maybe even at night, in that area had frightened her—and still did. She had hesitated for as long as she had dared before agreeing to participate. If there *was* anything new and important to be found in the Back-of-the-Yards, being part of the discovery would be a tremendous boost to her career when she needed it most, at the very beginning.

Griffin's smile was thin. "As sure as I can be, Cathy. If it is a hoax, it took better technology than what I could muster to try to expose it." DNA tests had been run on tissue samples taken from several parts of the carcass, proving that it was all one animal—including the detached snout. Comparisons of individual chromosomes had been run against every known species and subspecies of small rodent. As much of the skeleton as could be salvaged had been taken out and reassembled.

"Of course," Griffin said, "the only way we'll ever know for sure if it's real is to catch more of them, preferably alive."

"But what if it was a sport, one-of-a-kind," Nick Peragamos, Harmon's other graduate assistant, asked. He had jumped at the chance to take part, without ever thinking that there might be danger involved. The neighborhood he had grown up in had

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been almost as dangerous. He was a native Chicagoan. He was used to city conditions. Cathy was from downstate.

Griffin shrugged. "Then we're pretty much out of luck. We've got two snapshots, tissue samples, and the DNA of a curiosity, good for maybe a letter or two in the journals, and certain to catch a lot of skeptical flak."

Mrs. Beloit opened her front door while Griffin and his assistants were walking up the sidewalk. She pushed the screen door open as they got close. "Come on in," she invited, moving to the side so they could get by her.

Harmon nodded to her and smiled. "Thanks." They had spoken on the telephone several times during the past six weeks. At first, those calls had been Griffin phoning to ask if she had caught any more elephant-nosed mice, or seen any of them—and his updates on the laboratory work. Despite his early observation that the organ was more like an anteater's snout, he still thought of it in terms of an elephant's trunk. In his mind, at least, the name *elephant-nosed mouse* had stuck.

Over the past two weeks, Harmon had also taken considerable time to convince Mrs. Beloit to permit him to try to catch the new mice for himself—if there were any more to be caught.

It was dim inside the house. There were no lights on, so the only illumination in the living room came from the front window, filtered through beige sheers and open venetian blinds.

"Have a seat," Mrs. Beloit invited after Griffin had introduced his assistants. "Would you like some iced tea? I've got a pitcher in the refrigerator."

"Thank you. That would be nice," Harmon said. The others nodded.

They sat on the sofa, with the professor in the middle, while Mrs. Beloit went to the kitchen. Harmon opened the folder he had brought along and laid out several pages of DNA traces—those of the animal that Mrs. Beloit had caught and comparison samples from its nearest "known" relatives.

"That's what shows that the mouse I caught was different?" Mrs. Beloit asked when she returned.

"Yes." Harmon had to gather up the pages to leave room on the coffee table for the tray she was carrying.

Mrs. Beloit poured four glasses of iced tea, then sat in the rocking chair that was the only other seat in the room. She scooted the rocker closer.

"I'm afraid that goes way past anything I had in school," she said, pointing at the top sheet.

Griffin took a sip of his tea, complimented Mrs. Beloit on it, then tapped the first paper in his stack. "That is your mouse, Mrs. Beloit," he said. "It's a chromosome by chromosome picture of its DNA."

"Like a computer program," she suggested.

"Exactly," Harmon said. "We've studied many species of rodents. We have a good understanding of the combinations that are normally present in their DNA, and we know how most of those combinations express themselves in the animal. Most, not all. Even a mouse is an extremely complicated organism. Your mouse ap-

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pears to be most closely related to the common house mouse, *Mus musculus*, but there are considerable differences."

"You mean besides the nose, the snout?" Mrs. Beloit asked.

"Yes. If that were the only difference, the mouse would be in real trouble, probably unable to survive. For instance, the front legs are stronger, the shoulders bulkier. We assume that the muscles must be more highly developed through that section as well, though we couldn't tell from the one you caught. It was too badly decomposed. The animal would need to be able to balance that snout. In the same vein, the tail is slightly longer and heavier than in the normal mouse—as far as we could tell from the remains we had to work with. And it appears that there are differences to the digestive tract, suggesting that its dietary requirements are different—which is what I was aiming at when I compared the snout to that of the anteater."

"It's different," Mrs. Beloit said.

"Very," Griffin conceded. "It's amazing that there could be so many differences between this mouse and all of the others we know about, with no intermediate steps, no gradual development."

A short laugh, more of a snort, from Mrs. Beloit kept Harmon from continuing immediately.

"Just look at all the trouble I had to get anyone to pay any attention to the mouse I had," she said. "If I wasn't so mule-headed, you wouldn't know about this one. And in this neighborhood, most folks wouldn't care. They wouldn't go asking questions, even if they noticed that the mouse was so different."

"There is that," Harmon allowed with a grin.

"Tell me again, just what is it you want to do here?" Mrs. Beloit asked. "I want to make sure I know exactly what it is, so's there's no confusion."

"We want to survey your home from top to bottom, look for any possible routes that mice could use to get in and out. We want to set traps to try to capture some of these elephant-nosed mice alive. If there are any more of them—and I hope there are. We've got some special equipment, cameras and sound gear, to let us probe in the walls, floors, and ceilings without doing any damage. We have fiber-optic lens cables we can hook up to a video camera."

"Like they use in operations?" Mrs. Beloit asked.

"Yes, exactly."

"I work as a nurse's aide at the hospital," Mrs. Beloit explained. "I know about those."

"And the sound gear we have is really just an electronic version of a stethoscope," Nick Peragamos volunteered.

"We also have a couple of video cameras that can see in infrared to take pictures in the dark. They're triggered by motion detectors, so they can be left on overnight to cover possible routes that the mice might take, without running out of tape or needing someone to change the tapes every two hours."

"This equipment, it's expensive?" Mrs. Beloit asked.

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"Moderately," Griffin said.

"And you've got it out in that van now?"

The professor nodded.

"This isn't the worst neighborhood in Chicago, but it sure isn't the best," Mrs. Beloit said. "Maybe you should bring your gear in before too many people get a chance to nose around that van." She was moderately concerned that the equipment would not even be safe inside her house if too many people knew that it was there, but Professor Griffin had signed a waiver absolving her from all responsibility for theft of the equipment.

"I must confess that there's a strong chance that we'll be wasting our time and abusing your generous hospitality, Mrs. Beloit," Harmon said once the last of the equipment had been moved inside. "It's most likely that the mouse you caught is the only one of its kind, a freak, what we call a sport, and not part of a breeding population."

She nodded slowly and, after a long pause, said, "I've got mixed feelings on that, Professor. On the one hand, I'd like to think that I got rid of the *only* mouse in my home, but on the other hand, one dead and rotted mouse won't do you any good."

"Not as much as living specimens . . . or even dead ones that were still fresh enough to allay any doubts," he said. He had mentioned the first dead mouse to several colleagues, and had enlisted the help of a pair of them in running the tests on its remains. They were curious but skeptical.

"More of them would be . . . extremely important," Harmon said. "There are still arguments about just how evolution and the start of new species work. Some of my colleagues think that evolution is a constant, cumulative process, a lot of little changes eventually reaching a point where there is a new species. Others argue for what they call 'punctuated equilibrium,' that we keep the same species most of the time with only those little, inconsequential changes for ages and ages. But then, occasionally, there is a sudden spate of a lot of major changes, new species, in response to major changes in their environment."

Marietta Beloit watched Griffin closely through that explanation, nodding several times. "I remember some of that from school," she conceded. "I guess I never really thought it out before though. If there are more mice like the one I caught, it would argue for this punctuated equilibrium?"

"Very loudly," Harmon said. "And it would lead to searches for other new species, and professors scurrying to patch the holes in their theories—give a lot of scientists and a lot of graduate students new work to do."

Harmon Griffin had spent one of his undergraduate summers working for an exterminator. He knew how to conduct the necessary search. Now, Cathy and Nick did most of the work, moving furniture, crawling behind it, emptying cabinets and searching inside, looking for avenues that mice or other pests might use to get in and out. The obvious routes were found quickly, under the kitchen sink and under both bathroom vanities. The plumbers had left gaps around the in-

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let and waste lines, plenty of room for mice—or rats. And behind the kitchen sink there was one larger opening where a section of drywall had been broken out. That hole was seven inches wide and six high.

There was an attic above, but without a ladder to climb up, it had to be left, at least for the moment.

"Is there a basement?" Griffin asked Mrs. Beloit.

"No, just a crawlspace," she said. "The access panel is out back, next to the kitchen door."

There was a heavy metal panel over the opening, secured by a padlock. Mrs. Beloit had to go back into the house to get a key, and Nick went with her to get two flashlights from their gear.

"We're going under there, right?" he asked the professor.

Griffin nodded.

"All *three* of us?" Cathy asked.

"I think Nick and I can handle it," Harmon said.

"My children use this to store their bikes and a few other things," Mrs. Beloit said while she unlocked the panel. "The lawn mower's in there, too."

Under the kitchen, Harmon spotted a hole by the plumbing. Light showed. He kept crawling, stopping every couple of feet to shine his feet up along the floor joists. There were signs of rodents, droppings and so forth, and there were several holes in the packed earth he was crawling on—clearly tunnel entrances for mice or rats.

"Hey, Professor!" Nick called from the far side of the crawlspace. "Come over here. I found something."

"What is it?"

"No, come look," Nick urged.

Harmon sighed and started crawling across. Nick was almost at the front corner of the house, about thirty feet away.

"This better be good," he warned. "My knees are already aching."

"It is." Nick moved, but not enough for Harmon to see what he had found until he was within five feet. Then Nick moved to the side and flashed his light on his discovery.

"A skeleton," Nick said, "a cat's skeleton, I think. There's orange fur scattered around, but not much else."

Harmon put his light on the bones as well. The animal's skull had been crushed, pierced and broken into pieces. Few of the other bones were still in their proper place, but the pile of remains was fairly compact.

"It's a cat, all right," Harmon said.

"Look at these marks." Nick pointed at what appeared to be scratches across several of the bones. "It looks like something had cat drumsticks for supper."

"Take it easy with that kind of talk," Harmon said. "Mrs. Beloit lost a cat just before the mice showed up."

"Hell, that mouse she brought you didn't eat any cat," Nick said. "Not with that snout."

"No, but there are probably packs of rats in this neighborhood. Sewer rats. Norway rats, *Rattus norvegicus*. If the cat got hurt or sick and crawled down here from inside the house and rats found him, or the body, they sure wouldn't have let it go to waste. Let's finish looking around and get back out where I can stand up."

* * *

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"The cat you said was missing, was it orange?" Harmon asked Mrs. Beloit after he emerged from beneath the house.

"An orange tiger, like the one in the funny papers," she said. "You found Pickles?"

"I'm sorry. We found bones and a little fur, nothing else, but it was a cat."

"Don't tell the children," Mrs. Beloit urged. "Please, don't say anything about it to them."

Her three children had arrived home from school while the initial survey was going on. The youngest, a seven-year-old girl, arrived an hour before her two brothers. Samantha was the only one who gave the three intruders more than a passing glance. During most of the survey, she stayed close and watched. But while Harmon and Nick were under the house, she had gone inside. Her brothers had been home and gone in minutes.

Samantha had questions, dozens of them, some asked of all three strangers in turn.

"Are you going to find more funny mouses?" was her favorite question.

"We're looking for them," Griffin told her.

"You gonna kill them?"

"I hope not. We want to catch some alive so we can study them," he said.

"I saw the mouse Mama caught. I saw it first, even before she did."

"After it was in the trap?" Harmon asked.

The little girl nodded solemnly. "It was already dead."

Later she asked, "If you catch more, can I keep one as a pet? I used to have a cat, Pickles, but he ran away. I can keep a mouse in a little cage where he can't run away."

Harmon smiled. "Whether you can keep one depends on at least two things. One is how many we find. We need some to study. But more important, you'll have to ask your mother. She might not like to have a pet mouse around."

That sent Samantha off to her mother. When Samantha returned ten or fifteen minutes later, she didn't say anything about keeping a mouse as a pet.

"We've got everything set up, but there's not much more we can do today," Griffin told Mrs. Beloit a few minutes after six o'clock. "If you'll just switch on the controls for the two video cameras before you go to work, and turn them off in the morning when you get home?"

She nodded. "I can do that, all right, but what about those traps? I'm not real happy with having those little bitty ants you brought in the house."

"They won't get out of the traps, Mrs. Beloit. The sides of those glass dishes are coated with a special lubricant. The ants can't climb it or eat it. They just slide right back off. We had to improvise. If your mouse is specialized to eat small insects—and with that snout, my guess is that it is—it wouldn't do any good to bait the traps with cheese or peanut butter or the other things that people use to catch regular mice. And even if the ants *did* get out, say, if someone bumped into one of the traps and knocked one of the dish-

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es over, it still wouldn't hurt. The ants are all sterile. They can't breed and give you a long-term problem."

"I hope you're right."

"I am, about that, at least. Tomorrow morning, if there's anything in any of the traps, call me right away. I'll be in my office a few minutes after eight. If there's nothing, we'll be back out tomorrow afternoon, about the same time as today, to start using the probes to look and listen between the walls and so forth, to try to find where any mice might be nesting."

3.

The telephone was ringing when Harmon reached his office the next morning. Mrs. Beloit was on the line.

"Did we catch anything?" Harmon asked. His heart had started beating faster as soon as he heard the ringing.

"No. I thought you told me those ants couldn't get out of those dishes," Mrs. Beloit said.

"Not unless they were tipped over," Griffin replied.

"Oh, yeah? Those dishes are all empty, and none of the traps were touched."

"Have you actually seen any of the ants?"

"Not yet."

Harmon hesitated. The lubricant was supposed to be proof against the ants. It always had been. He had used it before.

"Maybe the ants didn't escape," he said finally.

"They sure didn't turn invisible," Mrs. Beloit countered.

"It might mean that the mice can reach farther with those snouts than we allowed for." It had been a rough measurement, as much guess as anything else. There hadn't been time to construct new traps. Griffin had taken a model that was available, that he could quickly convert for live bait. If those anteater-like snouts could reach the bait from the sides, it might explain how the ants could be missing with the traps empty. "I'll have to look to see if either of the cameras spotted anything."

It was Marietta's turn to hesitate. "You think that maybe I *do* have more of those mice?" The tone of her voice suggested that she hadn't given much credence to that possibility before.

"We'll know better after I run the tapes. I've got two classes this morning, but we'll be out first thing this afternoon. You'll be home?"

"I'll be here. I'm going to bed now. I just got home from work. But I'll be up before you get here."

"We can make it a little later, if you like," Harmon offered. "Give you a chance to get more sleep."

"No, one o'clock, like yesterday, is fine. I'm off tonight anyway, so I want to be able to sleep then."

Nick Peragamos *thought* that the glass dish in one trap had been moved, ever so slightly, closer to one side. "I was careful," he told the professor. "I put each one *precisely* in the middle. I've got a good eye for things like that."

Mrs. Beloit assured them that the traps had not been touched by her or her children. "I told them to stay away from the traps and your equipment, that I didn't want them bumping

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those traps and maybe letting the ants get loose."

She watched while Griffin carefully examined the traps and the now-empty dishes. She lifted an eyebrow, and bit at her lip to keep from talking, when the professor replaced the ants in the dishes.

"This way, we give them a chance to get away—if they can—while we're here," Harmon said when he noticed her look. "I don't think that's what happened, but I can't rule it out. Maybe we'll know better after we check the videotapes."

While Griffin had been working with the traps, Cathy and Nick had replaced the tapes in the two video cameras. Both cassettes showed that the tape in them had run for a short time. They would, at a minimum, have recorded five minutes after being switched on, as Mrs. Beloit left, and again in the morning when she approached, until she turned each one off.

"What we're looking for is anything between those two times," Griffin said after explaining to Mrs. Beloit that she would have triggered the cameras herself.

The tapes were standard VHS cassettes. There was a VCR in the living room. Nick handled the controls. The first camera had been set up in the kitchen, near the doorway so that it could cover most of the kitchen floor.

Mrs. Beloit walked away from the camera, visible for only an instant as the tape began to play. *I'd best make sure I'm dressed when I do that,* she thought as she watched herself. There was no movement at all on screen after that until the camera had shut off after five minutes.

At first, when the camera came back on, there was still no obvious movement. All four spectators watched closely.

"There, left of the stove," Cathy Dixon said, pointing.

The others had picked up the movement almost as soon as she had, a hot spot between the stove and the kitchen cabinets. Imagination more than vision pictured a tiny creature looking out, surveying the room. Only after the animal moved out of the narrow lane was the camera able to provide a clear view of it. There was something of a collective gasp from the spectators when they saw that it was indeed another elephant-nosed mouse.

"Gotcha!" Harmon whispered, leaning closer to the television. *If there are two, there must be more, maybe a* lot *more,* he thought.

No one else said anything. They all watched the mouse move away from the stove, taking several steps then stopping to look around, showing fairly typical behavior—tentative motion, nervous alertness. At first, the mouse's ranging appeared to be random, but after stopping twice to sniff the air—lifting its snout well above its head—the mouse zeroed in on the waiting trap and moved directly toward it.

The trap gave the mouse several minutes of difficulty. It went around it three times, stopping frequently, probing through the wire mesh with its snout, reaching toward the dish in the center. The mouse spent more than a

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minute near the spring-loaded gate that was meant to capture the mouse after it went inside. Twice, the creature put one foot forward as if to go in, but both times retreated instead.

Go on, go in, Harmon thought, unconsciously urging the mouse forward, forgetting that he was only watching a tape, and that the mouse would not go in because the trap had been empty.

The mouse made another circuit of the trap, reaching in through the mesh with its snout several times.

"There, I think he moved the dish," Nick said. "Pushed it."

Cathy shushed him.

The mouse continued around the trap. When it got to the far side this time, it made a more determined effort to reach the glass dish with its snout. And succeeded. The viewers could not see exactly what happened—the resolution was not good enough to actually let them see the tiny ants that had been used for bait—but it appeared that the mouse simply sucked them up.

"The smoking gun!" Nick crowed.

The mouse went around the trap once more. Then it made tentative starts in several directions away from it. Finally, though, it simply returned to the space between stove and cabinets where it had first appeared. The camera continued to run through the end of five minutes without motion.

The next view was in daylight, as Mrs. Beloit came in to shut off the camera. There was just one quick image of her.

The second tape showed two excursions other than Mrs. Beloit's appearances. The first trek showed an elephant-nosed mouse investigating the other trap but giving up and going back under the bathroom vanity. Then there was a second expedition. This time, after nearly ten minutes of effort, the mouse managed to get to the ants in the second trap.

"Is there any way to tell if that's the same mouse both times?" Nick asked. "Or if either is the one from the kitchen?"

"If you want to get stills made from the tape and spend some time doing detailed measurements, you might be able to tell about the ones in the bathroom," Griffin suggested. "If they show significant differences in size you might be able to tell that they're different specimens. Comparing that to the kitchen one would be more difficult—different distance and angle from the camera to the mouse. Of course, it could be three different mice and you still wouldn't be able to tell if they're all the same size."

"I think I'll hold off then," Nick said, retreating quickly. "That sounds too much like counting the holes in acoustic tiles."

"You still going to leave ants in those traps?" Mrs. Beloit asked. "Seeing as how those mice can get at them without going in anyway."

Griffin considered that for a moment. "I think that if we put a smaller mesh around the sides of the traps, something like screening, it should do the trick. That closes off the easy access to the ants. The only way the mice will be able to get them out then is to go inside."

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"Looked like they knew better than that," Marietta observed. "Wouldn't none of them go in. Like they knew it was a trap."

"If they're hungry enough, they'll go in even if they are suspicious," Nick said. "Hunger's a powerful force."

"We should have some screening in the van, in one of those brown cases in the back. Nick, you want to run out and see what you can find?" Harmon handed Nick the keys. "And something to attach it to the trap."

He turned to Mrs. Beloit. "He's right about hunger being a strong inducement. It depends how hungry the mice are."

After the traps had been modified, Griffin and Peragamos started using the fiber-optic equipment to probe inside the walls. They started in the upstairs bathroom because it was easier to get to the holes leading under the floor and behind the wall there than in the kitchen. While they worked the fiber-optic cable, Cathy started probing the walls of the house with the sound equipment, room by room. Her work went more quickly. Moving the fiber-optic cable around, reaching for the small gaps in the insulation and the holes through studs where wires and pipes ran, was a slow job for the two men. It was perhaps inevitable that Cathy was the first to report success.

"Sounds like a lot of heartbeats," she said when her companions came to the kitchen in response to her call. "It must be a nest. Right here." The location was halfway up the wall, behind and just above the counter left of the sink.

First Professor Griffin and then Nick Peragamos took the sound gear. The sound was a soft chirping, a nearly constant noise. With a mouse's heart rate over 700 beats per minute, there could be no more definition than that. To get anything more, they would have to take the audio recording being made and slow it down considerably and use other equipment—back in the lab—to try to get a count.

Harmon listened for more than a minute, then said, "I think you're right, Cathy," as he passed the earphones to Nick. "It's going to be rough getting the camera probe up there, though."

"I'm a whole lot more concerned about getting the mice *out* of there," Marietta said from behind the others. "I don't want mice nesting in my kitchen."

"We want them out of there also, Mrs. Beloit," Griffin said, turning toward her and turning on a smile. "Especially if they're your elephant-nosed mice and not the common sort."

"I don't care *what* kind they are, I just want to get rid of them as fast as I can," she replied.

"I understand. We'll do what we can." Harmon turned to Cathy. "Have you finished your survey of the kitchen?"

She shook her head. "I just started at the corner by the stove and got this far. When I heard the mice there, I called you right away."

"Well, finish in here with the sound equipment. If there's one nest, there might be others. Nick and I won't start working with the cables in here until

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you're done. We'd make too much noise for you to pick up anything."

"We going back upstairs to finish in the bathroom there?" Nick asked.

Harmon's hesitation was too fleeting for anyone to pick up on it. "No. We'll wait for Cathy to finish in here, then try to get a glass eye into that nest. She can finish the other rooms while we do that."

After three hours of work, Harmon and Nick had still not managed to thread the flexible fiber-optic cable into position to see the nest of mice. Frustration was mounting for both of them, and for the two women. Cathy had finished her survey of the rest of the house. She had found a second nest in the kitchen, and one possible nest in the upstairs bathroom. Mrs. Beloit did not stay with the academics all of the time. Once her children got home from school, she was in and out of the kitchen several times. Though she tried to stay away, she could not.

It was past seven o'clock when Professor Griffin pulled back out of the cabinet under the kitchen sink and shook his head. "I think it's time to call it a day. We're not getting anywhere. I'll leave the cable where it is. We'll put everything back in the cabinet around it, and try again tomorrow." He stood up and brushed the legs of his trousers.

"Have you figured out how to get those mice out of here yet?" Mrs. Beloit asked. She and her children had eaten in the living room. Before cooking supper, Mrs. Beloit had rewashed everything that she used to prepare and serve the meal.

"Not yet," Harmon said. "We're still trying to get in to see them."

"*Three* nests you found." Marietta Beloit considered that a scandalous affront to her abilities as a homemaker.

Harmon closed his eyes for an instant and took a deep breath. A headache had started to develop over his left eye. "We'll do our best," he promised. "It's not easy to get rid of all of the mice in a building when you've got everything going for you, and with these mice being so different, there's not much chance that any of the usual remedies would work. If they only eat bugs—and I'm guessing that they're that specialized—regular poison or traps wouldn't help. Poisoned baits aren't all that effective anyway. Regular mice can often tell without taking a lethal dose. That leaves gasses. Either poison bait or gas leaves dead mice in the walls to rot. You don't want that."

"There must be *some* way," she insisted.

"You can't possibly want those mice out more than we do, Mrs. Beloit. It's important for us to get as many of them as possible, and—if we can—alive."

"I wish Pickles was still here," Mrs. Beloit said, looking around to make sure that none of her children were close enough to hear. "Pickles was always a good mouser. She even caught a couple of rats over in the park last fall."

"But a cat can't get up inside the walls to where those nests are," Griffin said, also speaking softly. "Like I said, we'll do everything we can." He glanced at the wall, near the location

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of the first nest, then looked at Mrs. Beloit again, hesitating, unsure whether he should plant ideas in her head. But he was tired, and his head hurt. "There is one thing, if all else fails," he said.

"What's that?"

"If you took a metal pie pan and beat on the bottom with a heavy metal spoon, right about here,"—he indicated a spot just in front of where Cathy had found the first concentration of mice—"some of them might drop dead of heart attacks."

"You're kidding me now," Marietta charged.

Harmon smiled and shook his head. "Mice really are very delicate, timid creatures. It's not hard to literally scare them to death. A sharp noise where they don't expect it *can* kill them. They produce too much adrenaline and the bodies' systems overload. Seriously," he added when he saw the skeptical look on her face. "But that would be as bad as poison, leave dead mice rotting inside the walls, smelling the place up."

"I hope I'm not going to have to tear holes in the walls to get rid of them," Mrs. Beloit said.

It was near sunset when Harmon and his assistants finally left. There had been a little rain earlier and everything was damp. The slight breeze carried a heavy, musty smell.

Harmon let Cathy and Nick into the van, then walked around to the driver's side. In front of the vehicle, he stopped for an instant and raised a hand to his head, pressing back against a sudden increase in the pain over his left eye.

"That's all I need," he muttered, closing his eyes briefly. It would take all night to get rid of the ache, even using larger-than-recommended doses of aspirin.

Preoccupied, he almost didn't notice the wavy line of black paint that had been sprayed along the side of the van. He had opened his door and started to climb in before he did. Harmon stopped his motion and cursed under his breath for a moment.

"What is it?" Cathy asked.

"Some bright soul with a spray can left his mark," Harmon said. He looked at the line. "Must have been just before it started raining. Some of the paint ran."

"I hope there was a good coat of wax on the van," Nick said.

"You must be kidding," Harmon said. "The university waste money to *wax* a vehicle?"

They were almost back to the university before talk moved away from the vandalism.

"How *are* we going to get the mice out?" Cathy asked. "Even if we find some way to lure out all of the adults, any nursing babies will be left in the nests."

"We're not exterminators, anyway," Nick said. "Sure, we want to study the mice, but we don't need *all* of them. If we can study them in place, that's best, but failing that, as long as we get enough to establish a viable breeding colony in the lab we've succeeded, haven't we?"

"I suppose," Griffin said. His headache was rapidly getting worse.

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"I'd take all of them if we could get them, have a few to trade to other labs, maybe. Those elephant-nosed mice are going to be worth a relative fortune for some time to come. If we had the money available, we'd offer to relocate the Beloits, at least temporarily, go in and do whatever we had to do to get the mice, then repair the damage afterward."

"Isn't this important enough to get more research money?" Cathy asked. "We have good evidence of the mice now."

"If we were willing to wait a year, maybe two years, while the requests were processed and subjected to peer review and all the rest of the red tape, we might get enough interest and a few dollars. But in that time . . ." He shook his head. They would have to publish what they had already, the photographs, DNA investigation, and so forth. Other researchers would start looking right away. Money would probably be found somewhere for the job, but there was no guarantee that Harmon Griffin would be the first to get it. There were other biologists with better connections, and more secure scientific reputations, than his. "We'll do what we can, and whatever Mrs. Beloit will permit. Remember, we're in her home strictly on her sufferance."

4.

The ants were still in the glass dishes in the traps the next day. No mice had been captured. The video cameras had spotted mice investigating both traps, but they had not taken the bait.

It took another two hours of work for Harmon and Nick to get their fiber-optic system into the first nest. With the video camera running, Mrs. Beloit and the three researchers spent much of the next hour watching activities in the nest. Harmon counted eight adult mice. There seemed to be two separate litters of pups, but it wasn't possible to get an accurate count on them.

The presence of the probe in one of the nest entrances did provoke a certain amount of activity among the normally nocturnal mice. Several investigated the intruder. A couple squeezed alongside, out of range of the camera, apparently following the cable back as if searching for its origin. Except for the pups and nursing mothers, all of the mice eventually left the nest.

"We scared them off," Cathy said, pulling back from the monitor screen.

"Maybe," Harmon conceded. "But they'll probably come back. As long as the mothers don't leave their litters there's a chance they won't abandon the nest."

"How long do we leave the setup here?" Nick asked. "We've only got the one camera for this."

"But we do have a second fiber-optic cable," Harmon reminded him. "We'll leave this one in place and thread the other through to one of the other nests. The one in the bathroom upstairs will probably be easier than the other one here in the kitchen."

The professor and his assistants were late leaving the house that evening. It was well after dark. At the

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door, Mrs. Beloit was still voicing misgivings about the pests in her home.

"Haven't you come up with *any* ideas for getting rid of those mice for me?" she asked—a question she had voiced at least a half dozen times that day.

"We're still working on it," Griffin assured her—again. "If nothing else, once we've got all of them we can, I'll pay to have an exterminator come and get rid of your problem. But I hope it doesn't come to that. Your mice may be unique." He shrugged. "The government might not even *let* us kill them."

"You mean I might have to *keep* them?"

"I don't know," Griffin admitted. "If nobody finds more of them in other places, I guess it's possible. Endangered species." *Have to have the university's legal department check that out, I guess,* he thought.

Cathy was standing apart from the others, arms folded across her chest, looking around nervously. Except for the light coming through the open front door of the Beloit house, the street was dark. There was no streetlight at the near corner. The one at the other end of the block was blocked by trees, casting night-dark shadows across the lawn. When the professor finally started moving toward the van, Cathy moved between him and Nick, almost shouldering her way in.

"I really don't like being here after dark," she whispered when they were nearly to the street. "This place is dangerous, even with three of us. Anything could happen."

"It's no more dangerous here than on campus," Harmon replied, also keeping his voice low so that Mrs. Beloit would not hear. She had closed the screen door, but she was standing in the doorway, watching to make certain that the three made it into their van.

"I don't go out after dark on campus if I don't absolutely have to," Cathy said, getting in the van quickly when the professor unlocked the front door. "And then I try to do it with a crowd. I'm still not used to living in the big city."

Two young men came out of the shadows in the park across the street, then stopped near the far curb and stared as Nick and Harmon got into the vehicle. Griffin watched them out of the corner of his eye, careful not to make eye contact, and he locked his door as soon as he was inside. He quickly turned the key in the ignition. As the van pulled away from the curb, the two young men faded back into the shadows.

5.

The next morning, the telephone was again ringing when Harmon Griffin entered his office. Mrs. Beloit was almost incoherent in her excitement.

"We got one! We got one!" she shouted into the telephone. "One of those mice. In the kitchen. We got one!"

Harmon felt his heart flutter. It sounded almost too good to be true, even after seeing the mice on camera. At first, he couldn't speak, couldn't reply. He glanced at his watch, then sucked in a deep breath. "I've got a

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class at nine o'clock," he said, struggling to keep his voice calm. During rush hour, it might not be possible to make the round-trip in time for the class. "That lets out at 9:50. I'll leave here then." His second class was at eleven, but after traffic eased off, he should be able to make it there and back in seventy minutes. And he desperately wanted to get that mouse just as quickly as he could.

Professor Griffin ended up dismissing his first class nearly ten minutes early. He was too excited to concentrate on his lecture, or to stand still. He kept losing his place, repeating sentences, or trailing off into near incoherency. His distraction was obviously affecting his students. This was his large class, the freshman introductory course, seventy-five students. He came close to setting speed records on the drive to Mrs. Beloit's house, but he did manage the trip without attracting the attention of any police.

"In the kitchen," Marietta Beloit said as soon as she opened the door. "It's still alive."

The mouse was cowering next to an empty glass dish in the trap. It had, at least, eaten. When Griffin and Mrs. Beloit entered the kitchen, the mouse appeared to tense up. It turned its head toward the door, sensing if not actually seeing their approach. Harmon slowed down, moving as silently as he could to the trap. Cautiously, he knelt next to it. He leaned forward, wanting to get as close as he could. The mouse's unusual snout was curled to the left, along the side of its head and up onto its shoulder. The animal looked up, then back down, and backed into a corner.

"You're beautiful, mouse," Harmon whispered. Emotion more than thought was pulsing through him. Irrefutable proof of the animal's existence. There would be the academic papers, most likely a book. Status. A career made. But there was something else that pulled even more strongly at him.

A new kind of life, something no one else has ever seen alive—just me, Mrs. Beloit, and maybe her children.

"I never thought I'd say this about a mouse, but it *is* kind of cute," Marietta said from behind Harmon.

"Right now," he whispered, pulling back from the trap, "I'd say that it's the most beautiful creature on four legs on the face of this Earth."

"I wouldn't go *that* far."

Harmon got to his feet and chuckled softly. "No, I can see where you might not." He turned to her. "But that mouse is an unrelieved miracle. It shouldn't be, but it obviously is."

"That nose, or snout, or whatever it is, it couldn't eat anything very big through that," Marietta said, pointing.

"Probably not," he agreed. "Those ants seemed to do the trick though."

"I mean, it couldn't eat cockroaches or water bugs or anything like that. They wouldn't fit up that snout, would they?"

"Maybe when they were very young," he said. "But ants, fleas, lice, ticks, mites, and small spiders. There's obviously enough for them to eat, even in a clean, well-kept house."

Mrs. Beloit could not suppress a shudder. "Bugs!"

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"The thing is, regular mice and rats carry fleas, lice, ticks, and so forth all the time. It's the small bugs that infest rodents that cause most of the diseases that mice and rats get blamed for."

Marietta blinked once. "If it eats all those things, then it shouldn't have all of them on it, right?"

"A very logical hypothesis," Harmon said. "One that we'll have to test when we get this creature to the lab."

"You going to kill it?"

"No, we're not going to kill it." He shook his head, first vigorously, then more slowly. "Probably not," he amended. "We want more of these mice. With any luck we'll manage to capture enough to breed enough stock to do all of the necessary testing. Then we can let this one live out its natural span to maybe enjoy its fame as the first of its kind in captivity."

He glanced at his watch. "I've got to get right back to school. Have you got a couple of paper towels—something I can use to cover the trap to keep the mouse out of the sun?"

"Sure. Take all you want." She pointed to the dispenser on the wall next to the kitchen sink. "Don't they like sunlight?"

"Ten or fifteen minutes of direct sunlight can sometimes kill regular mice. Their systems can't handle it. I've got to assume that this kind is just as delicate."

Two minutes later, at the front door, Harmon paused. "Now that we've got a live specimen, it's time to give the species a proper name. You discovered it. We could name it after you—*Myrmecophagus belotti*. How does that sound?"

"Name a *mouse* after me?"

"Give you a footnote in all of the taxonomy texts," he said.

"Let me think on that."

By the time that Griffin got back to campus, he could no longer contain himself. He went along the corridor leading to his office knocking on the office doors of several of his colleagues, looking for someone to share his discovery—his triumph—with. But no one was in. He took the trap with *his* elephant-nosed mouse to his eleven o'clock class after getting a better cover for it and a supply of ants for the mouse to eat, as well as a small dish of water.

He set the covered trap on the desk in the classroom. None of the students coming in gave it any attention. Exhibits were not uncommon in this upper-division course.

"I have something special for you today," Harmon said precisely at eleven o'clock, while the last students were making their way toward seats. "Something that no more than five other people in the world have ever seen—so far as I can tell."

That did provoke an undercurrent of murmuring in the room. Several pairs of eyes focused on the covered object on the desk.

"It's not time to tell the entire story of how this came about. For now, I'll just say that it's part of a research project I am involved in, within a half-hour drive of this campus. There is a building that has a unique species of mouse, considerably different from any other known. As you are about to

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see, it is, ah, *remarkably* different from any other species or subspecies, apparently a massive mutation from the common house mouse, *Mus musculus*, that seems to breed true—although that has yet to be confirmed under laboratory conditions."

Harmon leaned forward. "Before I lift this, I want to caution you all to restrain yourselves. I don't want any noise, any loud reactions. We don't want to scare the poor creature to death. And, in case any of you have forgotten, it is unfortunately all too easy to do that."

By now, he had the rapt attention of all seventeen students in the room. Very slowly, Harmon lifted the cover from the trap, peeking underneath before he had it all of the way off to make certain that the mouse was still alive.

"The elephant-nosed mouse," he announced once it had been exposed. He kept his voice soft now. "The only living specimen in captivity, though I have the badly decomposed remains of one other in a freezer here at the university."

Students moved around in their seats or stood in place to get the best view they could of the creature.

"Now, very calmly and quietly, I want you all to file past to take a better look at it," Griffin said. "Don't get too close, but I want each of you to have a good look." He almost said, "This will be something you can tell your grandchildren about someday," but he bit off the cliché.

Harmon hovered over the specimen like a nervous mother during the procession, but the mouse seemed to take no notice of the parade of spectators that filed past his new home. He was still eating.

Harmon and his assistants were late getting to the Beloit home that afternoon. Nick and Cathy had insisted on spending time with the captured mouse first. For that matter, Harmon had not yet had his fill of observation—or showing off his prize.

The mouse seemed to adjust quickly to captivity. Griffin had moved it—him—to a regular laboratory cage after showing the mouse to his eleven o'clock class. The mouse made himself at home, building a nest from wood shavings in one corner, exploring the rest of his new world, and eating contentedly from the stock of ants that had been placed inside with him.

Griffin and the two graduate students carried additional traps with them when they left campus. "We've got to try to catch more of them," Harmon had said, several times. "We'll put traps along the runways we've spotted in the tapes." The problem, before long, would be finding bait for the traps—and a steady supply of food for the mouse they already had. Harmon had the last of the available ants with him. The next time the traps had to be baited, or the mouse in the lab had to be fed, he would need a new source. He had phoned in an order for a supply of live ants from one of the firms that serviced the biology department, but it would be Tuesday before that shipment would arrive—not nearly soon enough.

"We'll have to go ant hunting this

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afternoon," Harmon warned his assistants.

"How's that mouse doing?" Mrs. Beloit asked while she held her front door open for the academics.

"Thriving," Griffin said. "Now we need to find him a few companions."

"Too bad you can't stick the hose from a vacuum cleaner in the wall like you did that camera thing and suck them all out."

Harmon started to laugh, then stopped and shook his head. "No, that wouldn't work. We had more than enough trouble just getting that quarter-inch fiber-optic cable up there. A regular vacuum hose would never make it. Besides, if it did, it would almost certainly kill the mice, one way or the other. Even a narrow vacuum hose might kill them. We don't want that, at least not until we've caught a few more of them alive."

"Do you think I've got the only mice like that in the whole world?" Mrs. Beloit asked after she had closed the front door and followed the others through into the kitchen.

"As exceptional as it is to find anything like this, I'd say that the chances must be astronomical that they don't extend far," Harmon said. "They might be around the neighborhood, in the rest of this block of row houses, at least. Maybe outside, too, underground, in the area. But that's probably it."

The traps were set and baited. The videos from the night before were watched—the kitchen camera had run most of the night, following the activities of the mouse that had been captured. The cameras were loaded again. Cathy used the sound equipment to check on the other nests that she had located before. Harmon and Nick threaded the other fiber-optic cable toward the nest behind the upstairs bathroom wall.

Marietta had to work that evening, so she retired to her bedroom to sleep for a couple of hours—until her daughter got home from school. The researchers had no interruptions until the girl came in just before three-thirty.

It was nearly seven o'clock before the second cable was all the way to the bathroom nest. There were a dozen adult mice huddled together in it, but there appeared to be only one litter of pups, and they seemed to be nearly old enough to be weaned.

"If we could just cut through the wall quickly, we might be able to nab several of them," Nick suggested.

"Don't even think about it," Professor Griffin said. "The odds aren't that good. We'd be lucky to nab even one pup, and we couldn't abuse Mrs. Beloit's hospitality even if the odds were better than even that we could grab the whole lot of them."

"I know. I was just saying."

Griffin smiled. "I've toyed with the same thoughts. We'll just have to try to get as many as possible in the traps."

"Tomorrow's Saturday," Nick reminded the professor. "You want us to come out here on the weekend?"

"I think I can handle it alone. You and Cathy just take care of your work at the lab. I'll give Mrs. Beloit my

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home phone number so she can let me know if we get anything in the traps. Check in with me first thing Monday morning, though."

They left just before sunset Friday. But once more, as they approached the white van, several young men came out of the park to stand near the far curb and watch.

"This is beginning to scare me," Cathy said after they had driven away from the block. "Those guys, watching us, like they're just waiting for the right time to strike. They marked the van and now they're just watching."

In the middle seat, Nick was looking out the back window. He wouldn't say anything, not yet, but it was beginning to wear on his nerves as well.

"We don't know that it's the same ones who painted the side of the van," Harmon said. *Most* of that had come off after a brisk scrubbing. "They haven't done anything, haven't said anything." He glanced in the outside rearview mirror. "They're probably just curious, wondering what three white people are doing spending so much time in their neighborhood."

"What about Mrs. Beloit. Could she be in danger because of us?" Cathy asked.

"I'll mention the kids to her. She hasn't said anything. After all, it's her neighborhood. She must know if there's anything to worry about."

"Call her tonight, as soon as we get back to school," Cathy urged. "She's got to go out to work tonight."

"No, I don't know who they might be," Marietta Beloit said when Harmon told her about the young men in the park. "My boys were already in. If you had said something then, Teddy—he's the oldest—could have gone out with you to look. All my neighbors know what you folks have been doing here. I made sure of that the first day. Some folks might have wondered if I hadn't. *Then* there might have been trouble. People might have thought you were the law. But I don't know about any kids watching from in the park. I'll keep my eyes open and ask around."

"Please, be careful," Harmon said. "You've been so good to us all week. I don't want to cause you any trouble with your neighbors, or put you in any danger."

She laughed harshly. "Don't you worry 'bout me, Professor. I've lived a long time in this city. I can take care of myself."

6.

It was just past seven-thirty the next morning when the ringing telephone woke Harmon Griffin at home. On the bed next to him, his wife grunted, then poked him in the back. "You get that, honey," she said.

Mrs. Beloit was on the telephone, and she was even more excited than she had been the day before.

"We hit the jackpot, Professor," she told him. "There are *three* mice in the traps this morning. Three of them!" she repeated, her voice climbing in pitch and volume.

"That's great," Harmon said. "Three of them?"

"Two in the kitchen and one in the

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bathroom upstairs, right under the vanity."

Harmon rubbed at his eyes. "I'll be over as soon as I can. Maybe an hour and a half. Is that OK?"

"Fine, Professor. No trouble at all."

"Did you have any trouble last night after we left?"

"Not a glimmer. There was nobody across the street when I went to work."

There was no difficulty about getting into the labs even on a Saturday. Harmon took his three new captives in and spent an hour getting them situated with the mouse that had been captured the day before.

"I guess I'm going to have to hunt down some food for you critters myself," he said, hovering over the large glass cage he had appropriated for the mice. "Get enough to tide you over for the next few days, and enough to try to catch a few more members of your clan." The ants that he had had Cathy and Nick hunt up the afternoon before behind the Beloit house would not go far.

"You four just get chummy and I'll take care of everything else," Harmon said. All three of the new captives were female. Things were definitely looking up.

By Monday morning, the mouse count was five, two males and three females. The second male had been trapped Saturday night.

"We don't *really* need any more than that, do we?" Cathy asked when she joined Professor Griffin and Nick in the lab at noon Monday. "This should be enough to start a breeding colony."

"The more the merrier," Nick said. "The more we have, the better the chance of getting a little genetic variety."

"He's right," Griffin said. "With what may be a very small total population, the dangers of inbreeding are going to be exceptionally high in any case. Besides, we can use a few more days of observation of how they act in their native habitat. Record more tape of them in the nest, get more examples of their behavior when they're out in view of the other cameras foraging."

"Can we at least start leaving a little earlier, like well before sunset?" Cathy asked.

"Does it make you that nervous?" Harmon asked.

"Yes! I've been having nightmares. I keep seeing people watching me, just staring, until it's all I can do to not scream because I don't know what they're going to do next."

"It does get kind of spooky," Nick said. "It's like we're asking for trouble."

"OK, we can leave earlier," Harmon said. Their moment of privacy was over anyway. There were people coming. News of the unusual mice was beginning to spread around the university.

7.

"We'll leave the traps and the cameras for a few more days, maybe through Friday, and take the rest of our gear out today," Griffin explained to Mrs. Beloit that afternoon. Discussion between the professor and his assistants during the drive over had led

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to firmer plans. "I'll stop by every day to collect any mice we catch, rebait the traps, collect the videotapes, and put new ones in, spend a little time doing some observing while I'm here, maybe. If you would turn the cameras we have on, the two out in the rooms and the one peeking into the nest in the kitchen, before you leave for work at night, that will give us a chance to observe them when they should be most active."

"You figure you've got everything you need?" Marietta asked.

"Well, under other circumstances it might be nice to get video of twenty-four consecutive hours, get the full cycle, maybe repeat it several times over a couple of weeks to a month, but I don't want to impose on you that much." In ideal circumstances, he would have preferred to take over the house completely for as much as a full year, put a team of observers in to watch the mice around the clock. But that was clearly impossible.

"You think we'll catch all of the mice in just another four days?" was Marietta's next question.

"Probably not," Harmon admitted. "Traps alone might never do it. There would likely always be pups in the nests. And we haven't taken that large a percentage of them so far, and mice do learn to avoid hazards. But if we haven't got them all by Friday, I'll make arrangements to have an exterminator come in to get rid of the rest of them for you. If we can do that. I'm still waiting to hear back from the lawyers."

She nodded slowly. "But there's nothing to stop more of them from moving in, is there? I mean, if there are more of these mice in the block."

"No, there isn't," he agreed.

"You know, if all these mice eat are bugs, maybe they aren't so bad after all. Let me think on it, about bringing in somebody to kill them all."

It was six o'clock when they left the Beloit house on Monday, carrying the gear that they would no longer be using. The sun was still visible over the tops of the trees and buildings, but the street itself was already in shadow from the trees in the park.

"You're not going to need Nick and me to come out here any more?" Cathy asked as they walked to the van. "I mean, besides the fact that this place makes me nervous, we do have finals starting next week."

"I guess not," Harmon said. "I can handle things here. You two will be of more use putting in your time at the lab, observing our mice there and taking care of them."

"We should probably build them a better habitat," Nick said. "Something they might think of as normal, if we want to get the best breeding results we can."

"We'll work on that," Harmon said.

It was then that movement across the street caught their attention. Cathy was the only one to give a visible start, as well as a sharp intake of breath, but both of the men took note as well. It was not just two or three locals standing there watching them this time, but eight or nine young men, and they were already at the far curb.

"Play it cool," Harmon advised in a whisper. "We'll just get in and drive

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off as usual." Mrs. Harmon and her two sons should be watching from their home. Marietta had promised that they would, to try to see who might be menacing their visitors.

I hope she doesn't wait too long to call for help, if we need it, Harmon thought. He unlocked the front door on the right side of the van. Cathy got in, unlocked the rear door for Nick, locked her own door, then reached across the front, ready to open the driver's door—but she didn't do that right away. She wanted to wait until the professor got to it.

Harmon tried to act infinitely casual as he went around the front of the van, paying no *obvious* attention to the young men standing across the street. He thought about whistling, but decided that he would almost certainly botch it. His mouth felt much too dry. He saw Cathy stretching over to unlock the door for him. He had the ignition key in his hand.

"Hey! You the funny mouse man?" one of the young men demanded loudly. His companions shared a raucous laugh.

Harmon's regular pace faltered for an instant as he found himself caught between the desire to hurry into the comparative safety of the van and the instinct to reply. He glanced across the street, uncertain which of the young men had spoken.

"I guess you could—" he started, the need for a retort overcoming common sense.

He did not finish the sentence. From somewhere close, to his left, there was one terrible screech of pain. There was an almost human quality of terror to the sound. Harmon was almost certain that it had come from a cat. It stopped his words. It also diverted the attention of the watchers. There was no repetition of the screech, but from the same direction—farther off—a dog started barking, then two or three others joined in.

"What the hell was that?" one of the young men asked his companions. For the moment, they had all forgotten their quarry.

Harmon moved closer to the van's door. He was reaching for the handle when he saw something running down the street toward him. More than one something, low to the ground.

Professor Griffin stared. At first he did not truly believe what he was seeing. Two very large brown rats—more a grayish brown in color—were running right down the center of the street. The lead rat was carrying a cat, apparently dead, in its mouth. The orange tiger-striped cat hung limply, blood discoloring its fur as the rat dragged it.

But that was not the most arresting part of what Griffin was seeing. The rats themselves were different, and not only because they appeared to be rather larger than average Norway rats.

It was the teeth, the incisors, that were unusual. Rodents are gnawing animals. Rats and mice gnaw much of the time just to keep their incisors from growing out of control. Without that, the lower incisors of a rat could puncture the top of its snout and curve up into its brain, killing it. The lack of incisors had been one of the points of difference in the elephant-

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nosed mice. The dead one had only molars to grind its food.

These rats had upper and lower incisors protruding from the mouths. The teeth were at least four inches long. The first rat used its teeth to clutch its prey—which must have weighed two or three pounds more than it did.

The rats raced between Harmon and the line of watchers across the street, giving the humans no notice at all. Harmon turned, staring open-mouthed after the animals, oblivious to his earlier worry. Inside the van, both Cathy and Nick were also watching, but Cathy gave the rats only part of her attention.

When Harmon took a step in the direction of the rats, Cathy rolled down the driver's window and whispered, "Come on, Professor, get in," as urgently as she could.

He backed toward the door, fumbling for the handle while he continued to stare after the disappearing rats, already half a block away. He got in the van slowly. Before he closed the door, one of the young men across the street had turned to look, but he did not say anything.

Harmon started the engine and pulled away, wondering if he would be able to catch the rats before they left the street and started to eat the cat.

"What were those?" Nick asked, leaning up between the two front seats.

"I think that elephant-nosed mice aren't the only new species around," Harmon said. "I think we've just seen a pair of saber-toothed rats."

"What?" Cathy asked.

The professor ignored that question. "It looks as if the equilibrium might be getting punctuated."

It was Nick's turn to ask, "What?"

"New species," Harmon said. He slowed the van near the last spot where he had seen the rats and looked around. There was no trace of them though. "We've got elephant-nosed mice and saber-toothed rats. I wonder how many more new species we've got crawling around the Back-of-the-Yards."

He stopped the van, just pulling to the side of the lane. All three of them looked for the rats—without success—for a minute or more. Then Harmon moved his foot from the brake to the accelerator again.

"Is it too late to start over on my thesis?" Nick asked. ■

Those who wish to seem learned to fools, seem fools to the learned.

—Marcus Fabius Quintilianus

It is indispensable to have a habit of observation and reflection.

—Abraham Lincoln

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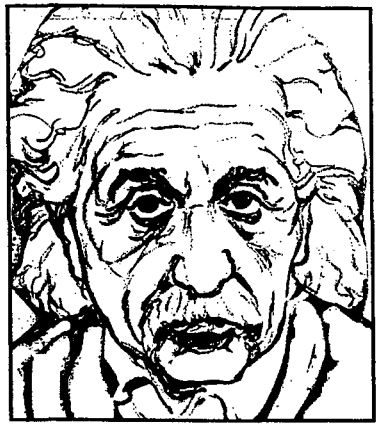
Ben Bova



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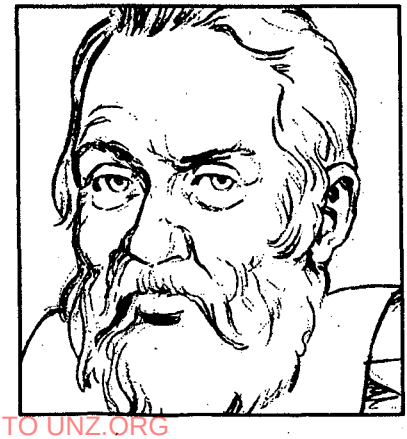

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If you can look into the seeds of time,
And say which grain will grow and which will not,
Speak then to me, who neither beg nor fear
Your favors nor your hate.
Shakespeare, Macbeth, 1.3, 58-61

In the January 1997 issue of *Analog*, Editor Stanley Schmidt pointed out that "History is full of highly regarded scientists either saying that such things as airplanes, spaceships, telephones, and home computers were impossible, or that they would have no commercial importance."

How true! Here are a few examples:

The committee appointed by King Ferdinand and Queen Isabella in 1486 to advise on the plans of Columbus concluded:

The Western ocean is infinite and perhaps unnavigable . . . Saint Augustine says there are no Antipodes . . . so many centuries after the Creation it is unlikely that anyone could find hitherto unknown lands of any value.

In 1844 Senator Daniel Webster pursued the same theme, in regard to the US acquisition of California:

What do we want of the vast worthless area? This region of savages and wild beasts, of deserts, of shifting sands and whirlwinds of dust, cactus and prairie dogs?. . . What use can we have for such a country?

Academic contemporaries of Galileo said of his discovery of Jupiter's moons in 1610:

Jupiter's moons are invisible to the naked eye, and therefore can have no influence on the Earth, and therefore would be useless, and therefore do not exist.

Lord Kelvin, physicist and president of the Royal Society, made no secret of his belief that heavier-than-air flying machines were impossible. In 1896 he wrote:

I have not the smallest molecule of faith in aerial navigation other than ballooning. . . . I would not care to be a member of the Aeronautical Society.

American astronomer Simon Newcomb published this in 1903:

The mathematician of today admits that he can neither square the circle, duplicate the cube, or trisect the angle. May not our mechanicians, in like manner, be ultimately forced to admit that aerial flight is one of the great class of problems with which man can never cope?

Two months later the Wright brothers flew at Kitty Hawk. Newcomb had to revise his views, but not by much. In 1906 he wrote:

The demonstration that no possible combination of known substances, known forms of machinery, and known forms of force can be united in a practicable machine by which men shall fly for long distances through the air, seems to the writer as complete as it is possible for the demonstration of any physical fact to be.

Nikola Tesla, the pioneer of electricity, prophesied in 1908:

The coming year will dispel an error which has greatly retarded the progress of aerial navigation. The aeronaut will soon satisfy himself that an aeroplane . . . is altogether too heavy to soar, and . . . can never fly as fast as a dirigible balloon.

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In 1933 the physicist Ernest Rutherford, soon after the first splitting of the atomic nucleus, predicted:

The energy produced by the atom is a very poor kind of thing. Anyone who expects a source of power from the transformation of these atoms is talking moonshine.

Albert Einstein agreed:

There is not the slightest indication that (nuclear) energy will ever be obtainable.

As late as 1945 the White House Chief of Staff, Admiral William D. Leahy, gave President Truman his considered judgment on the atom bomb:

That is the biggest fool thing we have ever done. . . . The bomb will never go off, and I speak as an expert in explosives.

Back in 1889 Thomas Alva Edison warned:

Fooling around with alternating current is just a waste of time. Nobody will use it, ever. It's too dangerous. . . . It could kill a man as quick as a bolt of lightning. Direct current is safe.

In 1907 W.W. Dean, a telephone company president, told radio pioneer Lee de Forest:

You could put in this room (Dean's office), de Forest, all the radiotelephone apparatus that the country will ever need.

De Forest himself was not immune to shortsightedness. In 1933 he said:

I do not believe that radio signals can be transmitted beyond the atmospheric envelope surrounding our Earth, due to the reflection of the radio waves from the Heaviside layer.

And in 1957:

Regardless of all future scientific advances Man will never reach the Moon. Man is inherently an earthy creature.

In 1927 Harry M. Warner, one of the Warner Brothers, expressed his satisfaction with silent films:

Who the hell wants to hear actors talk?

In 1943 Thomas J. Watson, chairman of IBM, said:

I think there is a world market for about five computers.

Charles Rolls, co-founder of Rolls-Royce and an early aviator, wrote in 1908:

I do not think a flight across the Atlantic will be made in our time, and in our time I include the youngest readers.

American aviation pioneer Glenn H. Curtiss stated in 1911:

With the possible exception of having more pleasing lines to the eye while in flight, the monoplane possesses no material advantages over the biplane.

T.A.M. Craven, US Federal Communications Commissioner, reported in 1961:

There is practically no chance communications space satellites will be used to provide better telephone, telegraph, television or radio service inside the United States.

Astronomer Simon Newcomb said in 1888:

We are probably nearing the limit of all we can know about astronomy.

In 1887 Albert Michelson and Edward Morley's experimental failure to detect the ether led in 1905 to Einstein's Relativity Theory. In 1903 Michelson was dismissive of his own achievement:

The more important fundamental

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laws and facts of physical science have all been discovered, and these are now so firmly established that the possibility of their ever being supplemented in consequence of new discoveries is exceedingly remote.

Professor W.W. Payno, responding to Professor Robert Goddard in 1908, said:

. . . Let me say briefly about [your] paper 'On the Possibility of Navigating Interplanetary Space,' that the possibility by your showing is so remote is it worthwhile to publish it? The speculation about it is interesting, but the impossibility of ever doing it is so certain that it is not practically useful. . . . I return the paper with thanks.

And an editorial in *The New York Times* of January 18, 1920 went even farther:

That Professor Goddard with his "chair" in Clark College and the countenancing of the Smithsonian Institution, does not know the relation of action to reaction, and of the need to have something better than a vacuum against which to react—to say that would be absurd. Of course he only seems to lack the knowledge ladled out daily in high schools. . . .

The *Times* has scarcely improved its understanding of space flight since!

In 1926 A.W. Bickerton, a New Zealand professor of physics and chemistry, examined Goddard's proposal for a rocket to the Moon:

This foolish idea of shooting at the Moon is an example of the absurd lengths to which vicious specialisation will carry scientists. . . . For a projectile entirely to escape the gravitation of the Earth, it needs a velocity of 7 miles a second. The thermal energy of a gramme at this speed is 15,180 calories. . . . The energy of our most violent explosive—nitroglycerine—is less than 1,500 calories per gramme. Consequently, even had the explosive nothing to carry, it has only one-tenth of the energy to escape the Earth—hence the proposition appears to be basically impossible.

In 1878 a British committee of Parliament reported on Edison's electric light:

Good enough for our transatlantic friends . . . but unworthy of the attention of practical or scientific men.

In 1907 the Wright brothers were also dismissed. The British War Office was:

Not disposed to enter into negotiations with any manufacturer of aeroplanes.

and the Admiralty's advisors:

. . . Were of the opinion that the aeroplane would not be of any practical use to the Naval Service.

In 1934 the British Air Ministry responded to the founder of the British Interplanetary Society, P.E. Cleator, thusly:

We follow with interest any work that is being done in other countries on jet propulsion, but scientific investigation into the possibilities has given no indication that this method can be a serious competitor to the airscrew-engine combination. We do not consider that we should be justified in spending any time or money on it ourselves.

Unfortunately, it's also possible to err in the direction of over-optimism. For example, Captain Edward J. Smith's 1906 statement of faith in ma-

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rine engineering:

I cannot imagine any condition which would cause a ship to founder. . . . Modern shipbuilding has gone beyond that.

Six years later Captain Smith commanded the maiden voyage of the *Titanic*.

On June 30, 1948, less than a week after nervously telling the military of their discovery—the company feared the security-conscious military would want to keep it under wraps—AT&T announced the invention of the transistor. The world yawned, seemingly more interested in their new television sets. *The New York Times*, to its everlasting credit, buried the announcement on its radio page.

Environmentalists have been making predictions, too:

In 1865, the English economist and social critic William Stanley Jevons predicted that England's coal supplies would be used up quickly by the expanding population of the prosperous Victorian era:

"The conclusion is inevitable that our present happy progressive condition is a thing of limited duration." (W. Stanley Jevons, *The Coal Question*, New York: Augustus M. Kelley, 1965, p. 164)

"There will soon not be a bird of paradise on Earth, and the ostrich has been saved [only] by private breeders. Man will not wait for the cooling of the world to consume everything in it, from teak trees to hummingbirds, and a century or two hence will find himself perplexed by a planet in which there is nothing except what he makes. He is a poor sort of creator." ("Man the Destroyer," *Audubon* 1, no. 1, 1886.)

In 1926, the Federal Oil Conservation Board announced that the United States would run out of oil in seven years.

In 1948, science commentator William Vogt's *Road to Survival* became a best-seller and book club favorite; he predicted that the depletion of soil and minerals would soon lead to smaller supplies and high prices, and possibly another world war, this one over natural resources.

The entomologist Paul Ehrlich predicted imminent doom unless the government made "manly brutal and heartless decisions": "the battle to feed all of humanity is over. In the 1970s the world will undergo famines—hundreds of millions of people are going to starve to death in spite of any crash programs embarked on now. At this late date nothing can prevent a substantial increase in the world death rate." (Paul Ehrlich, *The Population Bomb*, New York: Ballantine Books, 1967, xi.)

Barry Commoner, a biologist who ran for president in 1980, said that only a socialist system could control technology and the greed that exploits it. In 1969, he predicted Earth's life-support systems would be exhausted in fifty years. (Harry Lee Smith, "The Environment Since the Industrial Revolution," *Cato Policy Report* 13, March/April 1991, p. 11.)

The Limits of Growth declared that four forces, like the Horsemen of the Apocalypse, would end the world's joyride. These forces were famine, the exhaustion of mineral resources, overcrowding, and pollution. The world's growing population would soon be fighting for food, making itself sicker with industrial pollution,

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and paying higher and higher prices for natural resources. The authors told readers that by 1981 the world's gold would all be mined. By 1985, its mercury would be gone. By 1990, no zinc; by 1992, no petroleum. By 1993, there would be no more copper for electric wiring or pennies, and no natural gas for home heating. (Fred L. Smith, "Carnival of Dunces," *National Review,* July 6, 1992, p. 30.)

In 1968, George Wald, a Harvard biologist, won the Nobel prize for his work in physiology and medicine. In 1975, he predicted that the world would end in twenty-five years, and later decided that the end might come as early as 1985. (George Wald, "There Isn't Much Time," *The Progressive, December 1975, pp. 22-24.)*

Richard J. Barnett, in "No Room in the Lifeboats," *New York Times Magazine,* April 16, 1978 (pp. 32-38), warned that "the cost of natural resources is going up" and that we were entering an "Age of Scarcity."

Enough of predictions! Here are a few statements by scientists that seem to make sense:

Victor Weisskopf, science advisor to President Eisenhower, pointed out:

The total cost of all basic research from Archimedes to the present is less than the value of ten days of the world's present industrial production.

Jet Propulsion Lab scientist Larry Soderblom said:

"Just because an idea is crazy doesn't mean it's wrong."

All right, one more prediction. It's difficult to beat this one, made by Benjamin Franklin in a letter to Joseph Priestly, 8 February 1780:

We may learn to deprive large masses of their gravity, and give them absolute levity, for the sake of easy transport. Agriculture may diminish its labor and double its produce; all diseases may by sure means be prevented or cured, not excepting even that of old age, and our lives lengthened at pleasure even beyond the antediluvian standard.

Finally, there is Arthur C. Clarke's dictum:

When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong. ■

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THE ATOM LASER

The hot physics news at the beginning of 1997 was a breakthrough in experimental physics, the demonstration of an atom laser. A team of atomic physicists, led by Prof. Wolfgang Ketterle at MIT, published papers in the journal *Physical Review Letters* describing their method, and in *Science* magazine describing their results. The work is an outgrowth of the 1995 success of the Boulder group of Cornell and Wieman in producing a "Bose-Einstein condensate," an ultra-cold aggregation of atoms that are all in exactly the same quantum state. [See my column "Bose-Einstein Condensation, a New Form of Matter," in the March 1996 issue of *Analog*.]

The words "atom laser" appearing in a science fiction magazine conjure up visions of death rays and space battles. The real device is rather different in its implications and ultimately is much less likely to be a weapon than a tool for probing the innermost secrets of Nature. Therefore, let's begin by reviewing some basic facts about quantum statistics and the ground rules for the operation of lasers.

All atomic-scale particles have the property of "spin" or intrinsic angular momentum, like tiny tops that must always spin and never stop. It is reasonable to think that if an object like an atom were rotated by 360° it would return to its original state. In quantum mechanics that assumption leads to a rule which requires spin to be "quantized," in that it must always have a value that is an integer multiple of $h/2\pi$, where h is called Planck's constant ($h = 6.626 \times 10^{-34}$ Joule seconds and pi = 3.14159 . . .). Photons of light, for example, obey this rule by having one $h/2\pi$ unit of spin that points either along or against their direction of motion.

It came as a real surprise when in the 1920s experimental physicists discovered that the electron breaks this quantization rule by having a spin that is 1/2 of an $h/2\pi$ unit. This means that electrons (along with quarks, neutrinos, protons, neutrons, and many atoms) are not the same after a 360° rotation and must be rotated through 720° (two full turns) to return to their original states. The distinction between particles with integer spins (like photons) and half-integer spins

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(like electrons) is very important in atomic physics because the two types of particles have distinctively different statistical properties. The particles with half-integer spin have the statistical behavior first described by Enrico Fermi and Paul Dirac and are called "fermions," while integer spin particles are called "bosons," and show a statistical behavior first described by S.N. Bose and Albert Einstein.

Fermions behave as highly territorial individualists as described by the Pauli exclusion principle, with only one particle allowed in each quantum state. If one fermion occupies a particular quantum "box" described by spin orientation, momentum, and position, then all other fermions are Pauli-excluded from that box.

Bosons, on the other hand, tend to congregate together like gregarious groupies. If one boson is in a particular quantum box, all other bosons are "invited in" to share the same box. The more bosons that pile into the box, the stronger becomes the tendency for others to join them. In such a state, a very large number of particles will have a single quantum wave function. This is a Bose-Einstein condensate, as previously described here. It is a state of matter which had been predicted since the 1920s but which was observed in atomic systems only since 1995.

The optical laser is a good example of the uses of the grouping-tendencies of bosons. "LASER" was originally an acronym standing for "Light Amplification from the Stimulated Emission of Electromagnetic Radiation." However, the term has now become a part of the language, a noun that refers to any device that produces coherent radiation. Therefore, even if the device emits atoms instead of light, as in the present case, it is still a laser.

The key phrase in the laser acronym is "stimulated emission," a central property of Bose-Einstein systems. A conventional optical laser operates as follows. By pumping in energy from outside, confined atoms or molecules are all placed in the same long-lived "excited state," so that each is rather like a tiny cocked mousetrap on the atomic scale. Each excited atom or molecule can "fire," producing a new photon and changing back to its lowest state of energy. However, because the excited state is chosen to be long-lived this does not immediately happen. This ensemble of excited atoms or molecules is called a "population inversion."

The boson "groupie" tendencies of the photons of light mean that if an excited atom or molecule is presented with a photon identical to the one it is about to emit, then producing the new photons becomes easier. Thus the photon emission is "stimulated" by Bose-Einstein statistics. The more photons that are present, the larger the stimulation. The stimulation factor S rises as the factorial of the number of photons involved. (S=2!=2 for two photons, S=3!=6 for three photons, S=4!=24 for four photons, S=5!=120 for five photons, S=6!=720 for six photons, etc.)

This rapidly increasing stimulation factor leads to an avalanching wave of light photons that pass through the ensemble of atoms or molecules and

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emerge with a large number of photons, all in the same quantum state, all traveling together with the same wavelength and with their spins pointing in the same direction. This is a laser beam. It is possible because photons from previous atomic transitions "invite" other photons to join their state through stimulated emission as they move past, triggering an avalanche of atomic transitions and forming a beam of photons that are all in exactly the same quantum state. Such a beam of photons is called "coherent" because the waves of all the photons are exactly in phase, rising and falling together as they move through space. Coherence gives special characteristics to the beam, including coherent interference, enhanced interactions, and "speckle" formation.

OK, if that's a normal optical laser, then what's an *atom laser?* And in particular, since excited atoms don't emit other atoms, how could we arrange for the population inversion and the stimulated emission necessary for laser action?

The answers to these questions are provided by the magnetic trap used to produce the Bose-Einstein condensate of atoms. This magnetic trap, made with a pair of loop coils above and below the clustered atoms with oppositely directed currents, produces a four-leaf clover "quadrupole" field that interacts with the aligned spins of the atoms to hold them in place. In the trap several million sodium atoms are cooled to temperatures well below 2 microKelvins. There the Bose-Einstein condensate of sodium atoms forms, and all atoms go into the same quantum state with identical quantum wave functions.

The trick that Ketterle's group uses is to perturb a trapped condensate of sodium atoms with radio waves that can be absorbed by the trapped atoms, propelling them to an untrapped state. This then is the population inversion: the trap itself behaves like an excited atom of an optical laser, ready to emit sodium atoms and de-excite, while the untrapped sodium atoms are like the photons emitted from the optical laser. Each new untrapped atom enhances the probability that more atoms in the same quantum state will be released, and a clump of sodium atoms in the same quantum state emerges from the trap. The strength of the radio waves is adjusted so that clumps containing about 100,000 sodium atoms emerge from the trap in a coherent pulse.

The photons leaving an optical laser emerge traveling at the speed of light, but the untrapped-state atoms that emerge from the Bose-Einstein condensate are at rest and separate from the trapped atoms only because of the pull of gravity. The atom clumps literally drip slowly downwards out of the condensate. The clump of emerging atoms is coherent like the light pulse from an optical laser, but its speed, for the same downward distance of travel, is no greater than a dropped rock would have.

Having created the conditions for an atom laser that produces a coher-

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ent clump of atoms, it was necessary for Ketterle's group to demonstrate that the emerging atoms were truly in a coherent state, that the device was truly a laser, not just a leaky atom-scale trap. They accomplished this by simultaneously producing two Bose-Einstein condensates and perturbing them both with the same radio waves, so that both produced atom-clump drips that fell downward, expanding as they fell. After they had traveled a certain distance downward the clumps began to overlap, and a zebra-striped pattern was observed to appear in the overlap region.

The zebra-striped pattern is a direct result of quantum interference between the two clumps of atoms, each clump behaving like a single wave. In places where the two wave functions are in phase, rising and falling together, they reinforce, and the probability of detecting an atom there is twice as great as if there had been no definite phase relation between the atom's wave functions. In places where the two wave functions are opposite in phase, one rising as the other falls, they cancel, and the probability of detecting an atom there is zero. The result is a set of bright and dark bands that are an unambiguous signal that two atom lasers have indeed been created and arranged so that their beams can coherently interfere.

Finally, let's briefly consider the SF implications of this discovery. At least in its initial form, the atom laser with its dripping beams does not remotely resemble the ray gun of space operas. The number of atoms in Ketterle's atom laser pulse, about 10^5 atoms, is very small compared to perhaps 10^{24} atoms in a rifle bullet, and the rifle bullet moves at a much higher speed. While the clump of atoms could in principle be speeded up by transport through some acceleration device, the low intensity would limit its potential use as a weapon.

The new and interesting thing about the atom laser is the coherence of the atoms in its beam. In the next few years we can expect to witness a series of clever experiments exploiting coherence to test and probe various aspects of Nature, particularly in the areas of gravitational and atomic physics.

And we can speculate a bit on the SF side. One of the most interesting outcomes of the development of optical lasers was the production of holograms, interference patterns that can be used to re-create a three-dimensional images of the laser-illuminated object that produced the original interference pattern. Can this be done with atoms? Could one re-create, even mass produce, three-dimensional objects by illuminating recorded interference patterns with coherent beams from atom lasers that crossed and deposited their atoms in the desired pattern? That certainly suggests possibilities for science fiction and perhaps even for real physics.

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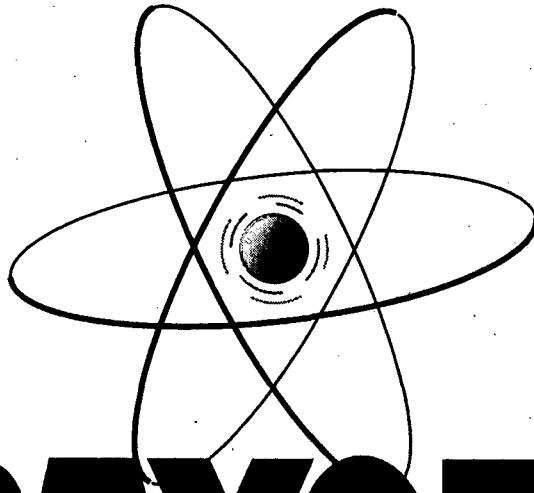

PAYOFF

Scientists need goals—but where they wind up may be quite unexpected!

Larry Kraus took a deep lungful of the warm, dry air that would make the walk to his favorite Vietnamese restaurant so pleasant today. It was rare for Washington to be so comfortable this time of year; rare enough that he'd be a fool not to enjoy it. Which Larry Kraus was not.

Still, his mind went back to work as he walked. He ground his teeth at how little had been accomplished in the four months since he'd taken over the Department of Energy. Four months of—of being lobbied by businesses looking for a bigger teat at the federal sow; of negotiating with Congressmen over their pet projects; of wrangling over staff decisions, office policies, and which way the toilet paper should hang in the rest rooms. And worst of all, having to listen to every crank, quack, and lunatic with

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inside connections . . . Damn! If he could just replace the bureaucrats and political hacks with doers; but that just wasn't the way it worked. No, Washington was very good at stopping people from doing things, but getting it to do: There it functioned more like the body's immune system, tearing apart the old and keeping the new from getting in. While the body just withered away. Sometimes he lay awake at nights, wondering what kind of bombshell it would take to finally get things moving. A big one, that was for sure.

At the restaurant he ordered his favorite bowl of *phó*—the Vietnamese rice noodle soup he'd come to love so long ago—and sat back to contemplate it. At least he had that. And always would, as long as he had anything to say about it. He'd never seen reason to deny himself *phó* simply because it didn't fit the image people expected him to fit. Besides, probably no one even knew exactly where he went for lunch every day.

"Hello, Larry."

He almost didn't realize that the voice was addressing him. When he did—he turned into openmouthed stone at the face he was suddenly staring at. It couldn't be . . . and yet only a moment in his database told him that it was.

"Jennifer? Jennifer DePaulo?"

A lifetime collapsed to a singularity. More feelings and memories than he could sort out rushed at him like a tidal wave at a small island. Jennifer was wearing one of her old smiles, a little thin and cracked around the edges, but still with the magic it once held for him. Ditto the soft, round face, and brown eyes. Only her hair with its short perm was substantially different; older, with hints of experience and maturity he could only guess at. The navy-blue business suit also made a distinct contrast from the sweatshirts and beat-up jeans she used to wear, though on a figure which couldn't be a pound heavier.

"This isn't a very polite way to say hello to an old friend, Larry," she chided him. "How about 'Please sit down and join me' instead? I haven't eaten yet and it looks like you're just starting. It's nice to know I made at least one permanent impression on you," she added, gesturing at his bowl.

The gesture made him notice the case, which though small, looked heavy in her elegant hands. He remembered his manners in time and stood up. "I'm sorry. Please, sit down. Christ, Jennifer, is it really you? I can't believe it. How many years . . ." He grabbed the waitress and duplicated his order without finishing the sentence.

"More than enough." They sat, Jennifer placing the case on her lap gingerly as though it held something precious. "So Larry: how are you? What have you been doing all these years? I see you've done pretty well by yourself lately, at least. The Secretary of Energy." She raised an eyebrow approvingly. "You must have done some things right these last twenty years."

"A few," Larry agreed, unsure exactly what she meant by the remark. He decided not to worry about it, however. "But you're taking advantage of common knowledge. Tell me what you've been up to first, and then we'll start on

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even grounds. As I recall, you were getting ready for medical school when we . . . when we parted company."

"You have a fairly good memory," Jennifer confirmed. "To fill you in on the rest, I do get to put MD after my name. But you're forgetting the other part. Remember? It's practically the reason why we broke up."

Larry had to think a few moments. Whereupon he shook his head decisively. "I was never against your becoming an astronaut, Jennifer. If you blame it on that, you're wrong."

She looked at him as though he were a politician weaseling out of a campaign promise. "Like hell you weren't against me. You were against *anyone* becoming an astronaut. And thanks to people like you, nobody is anymore. These days NASA's just a second-rate organization with a few labs and a cut-rate planetary mission once every few years.

"But I didn't follow you here to have all the old arguments over again," she quickly backed off. "What's done is done. Besides, you wanted to know what I've been up to. Fortunately, that's the reason I'm here. You see, I've also been working in the energy field, if from a slightly different angle than yours."

What she said didn't click immediately. "You?"

"Surprised? Well, it is a rather complicated story. Which isn't important. What's important is this."

Her hand reached into her case. It emerged holding a small globe of the Earth, made of glass or Plexiglas, or maybe even quartz crystal, it was so bright and smooth. Like a perfectly round sea-polished pebble, gleaming in the Sun. An Earth complete with mother-of-pearl ice and cloud patterns, sapphire blue of oceans and emerald of rain forests, and the varied stains of simple soil and rock. It was so perfect that it even had a day and a night side, the latter sparkling with the same lights of civilization you would see from space. It was a work of art, created by hands whose skills Larry had to admit were beyond his comprehension.

She set the globe down in a plastic holder on the table before him. Larry found himself staring at it admiringly. But also without understanding. "What is it?"

"One of the members of our group is an artist," Jennifer answered cryptically. "You don't care about that, though. What you care about is what it does. Here, I'll show you."

She placed a fingertip in Larry's water glass, pulling away a single, pearly drop of liquid which she deposited on the north pole. The surface must have been permeable at the spot; the drop vanished within seconds, leaving no indication that anyone had disturbed the area. In fact, it looked exactly as it had before.

"Now watch."

He didn't notice the change at first. When he did, he realized he'd missed it because it was happening continuously. The day/night line was moving, and the cycle was speeding up. Within a couple of minutes it had accelerated to the point where it was hard to focus on any feature of the object before it vanished into either darkness or light. Soon the entire surface became smeared in the purple and gray

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of permanent twilight as the terminator raced across the globe faster than the eye could follow, in a crazed, inexhaustible mania. It was like a stroboscope at breakneck speed. Finally he turned away, realizing that the effect would make him nauseous if he watched it for too long.

He was about to demand that she stop it somehow when she pulled something else from her case: a spray can with a long plastic tube on the nozzle. She jammed the end of the tube against the same spot she'd placed the water. There was a brief hissing sound, then the globe began its slow return to normal rotation. She put the can away.

"Chloroflourocarbons," she explained. "Temporarily poisons the coordination sites on the catalyst. *Always* have a way of turning the power off. We learned that with fission."

Larry was staring agape. He finally realized he'd become mesmerized, and shook off the fog. "So: what do you think?" Jennifer asked him. "Impressed by my little toy?"

Larry reached out and touched the globe. And jerked away instantly: it was warm, warm in a way he couldn't explain, preternaturally warm. "I'm afraid I still don't understand, Jennifer. Are you saying this thing is powered by water? But the only way to do that is if it's. . . it's . . ." It was impossible, of course. The department was spending billions of dollars every year on fusion generators so large they filled entire living rooms; this thing wasn't much larger than a baseball.

"*Cold* fusion powered," she corrected him. "Yes, Larry, that's what I'm telling you. We've found a way to make hydrogen fuse at ordinary temperatures and pressures, using simple chemical catalysis. Fleischmann and Pons were right, even if they were so ahead of their time that no one would listen to them."

At that moment, the waitress returned with Jennifer's *phó*. She threw herself at it with relish. The sight unearthed memories long buried: she was the one who had introduced him to the delights of Vietnamese cuisine; and it had been as much her own enthusiasms as the wonderful flavors and textures which had addicted him for life.

"Sorry," she finally came up for air. "But this is the first thing I've had to eat all day." Her mouth pursed in determination, then softened. "I expect you have about a thousand or two questions at this point. Well, ask away. I won't guarantee to be able to answer them all, or even any of them, but I'll try. What I can tell you is that it's completely non-polluting. Doesn't even leave any radioactives. Don't ask me how, though. We're not even close to having it figured out yet, except that we know it's some kind of crystal." She shoved a skein of noodles into her mouth with her chopsticks.

Larry shook his head in a combination of confusion and disbelief. Cold fusion? But that bit of quackery had been vanquished from serious science some twenty-five years ago. Now it was regarded as having as much chance of being true as Santa Claus and the Tooth Fairy. If anyone was still working in the field, they weren't

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publishing anywhere he would admit to knowing about.

Those were facts even an old girlfriend didn't change. Even one like Jennifer.

Jennifer looked at him as though she were reading his mind. "Let me answer the question you won't ask first," she said. "No, this isn't a joke. Nor is it the product of an overactive imagination. Take a look at this." She reached into a pocket, and pulled out a plastic rectangle and handed it to him: a NASA ID card. "You can check my credentials with my employer if you have any doubts. They'll vouch for me. Besides, you know me, Larry. Whatever else you think of me, you know I wouldn't try to pull something over on you. Not something like this anyway."

Larry fingered the card and returned it with no more comment than a frown. "But don't take my word for it." She pushed the globe toward him. "Here. Give it to your best people and let them subject it to any tests they like. If you can find another explanation for the excess heat and helium I'd like to hear it."

She suddenly leaned over the table, her face bright with excitement. "You know what this means, don't you? It means we can light up whole cities on what you flush down your toilet. It means no more energy problems, forever, till the end of time. It means—you know what it means, Larry; it's what you're spending billions of taxpayers' dollars chasing. Well, I've caught it for you. And brought it here, all gift-wrapped and shiny. The only question is, do you want it?"

Larry sensed himself being overpowered by a combination of events and enthusiasm. Fortunately, he'd gotten pretty good these last few months at dealing with people who had the answer to the country's energy problems. This time he didn't retreat from the globe, but deliberately mused over it. "Let me get this right. You're saying NASA developed this?"

At this point, the largest grin Larry had ever seen on anyone's face grew across Jennifer's like the Cheshire cat that just swallowed the canary. "No, that's not exactly what I'm telling you. And 'developed' might be the wrong word in any case." She paused momentarily. "Tell me, Larry: what do you know about Project Ares?"

He had to hunt through his mental archives to find it. "Ares? That's the robot they sent to Mars to find life, isn't it?"

"The robot was just the surface module," she corrected him. "There was also an orbiter, and a return module which brought soil and rock samples back to Earth. One of those samples, as it turned out, contained something . . . unusual."

She started to say more, then stopped. Larry slowly pushed his bowl of *phó*, which had already gotten tepid, aside. He tried not to stare at her, but it was difficult. "Wait a minute, Jennifer. Wait a minute. Are you telling me that what powers this thing," he gestured at the globe, "came from outer space?"

Jennifer shook her head in disappointment. "Not outer space. Mars. Yes, that's exactly what I'm telling you. The most important discovery in

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energy since plutonium is from another world. Galling, isn't it?"

"Mars." He remembered some of the bad science fiction he used to read as a kid. Something from Mars seemed to be the premise of most of the plots. They looked especially silly once it was discovered—at a cost of billions of taxpayer dollars—that the Red Planet was as dead and useless as the Moon.

"Hard to believe, I know," Jennifer read his mind again. She cleared her throat. "We didn't believe it ourselves until we'd repeated the experiments almost a dozen times and looked the data over about a thousand. Some of us still don't believe it. Believe it or not though, the evidence is right in front of your eyes."

She shrugged. "Unfortunately, this is all we've been able to do with it so far. A few toys and such. And that's only because through a lot of trial and error we figured out how to grow small batches from a seed. What we need is a way to grow as much as we need; preferably by the ton. If we figure out how to do that. . . ."

Larry had managed to stop staring, but he was still having a hard time assembling what he was being told. He steepled his fingers together and composed himself. "This is a pretty incredible story you're telling me, Jennifer. In fact, it's the most incredible story I've heard in my life; and I've heard a few wild ones." He took a deep breath and let it out slowly. "In fact, it's so incredible that what I don't understand is why I'm hearing about it this way. Where are the Weblines? Or even pages? For that matter, why isn't NASA shouting it from the rooftops? This is the best publicity they've had since Neil Armstrong set foot on the Moon. So why aren't they telling everyone who'll listen?"

He hadn't intended his questions to sound suspicious, but if they did, Jennifer didn't appear ruffled. Indeed, the way she pushed her bowl aside also and leaned toward him suggested that she'd been expecting them. "Ah, now we get to the real reason I'm here," she said in a conspiratorial tone of voice. She glanced about, as if concerned there might be eavesdroppers, but was satisfied there weren't. "You see, we haven't published any of this anywhere. Nor do we intend to."

Larry felt himself retreating, stopped himself. "You don't?"

"No." She raised a hand. "Think about it Larry. Even with all the proof we need, the worst thing we could do is simply announce it to the world. God only knows how the scientific community would react. Remember what happened to Fleischmann and Pons when they took that route. And they were at least chemists; most of us are just medical researchers for God's sake, who got mixed up in something we've no business in. No, publicity would be disastrous. We realized that very quickly."

She let that sink in. "So you're saying you haven't told anyone?" Larry finally asked. "Not even other people in the field?"

"You're the first to know, outside of our group."

"I see." Larry took a few seconds to absorb that also. Then he lifted the globe, held it aloft before him, and studied it as though it held some great

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secret for all of humanity. Then he gently lowered it onto its holder again. He nodded in understanding.

"The only thing to do was take it straight to you," Jennifer confirmed. "We certainly don't have the resources to figure it out and develop it ourselves. With your budget though, you could do it in secret with pocket change and leave no one the wiser. As for the scientific arguments, well—they can wait until after the country is saved, if anyone still cares."

It was at that point that Larry starting allowing himself to feel it. The excitement. "My God, Jennifer, do you realize—have you any idea what you've done?" He fingered the globe again. "This is, is . . ." He shook his head. Maybe if he pinched himself—no, if it were a dream, he didn't want to know. Not yet, anyway. He couldn't bear it if he woke up now.

"We didn't do anything," she was correcting him. "All we did was believe our data."

"Still—"

She pushed the globe toward him. "It's real," she said, her voice almost laughter. Almost but not quite mocking laughter. "Realer than anything you've imagined in a long time, I'm sure. Don't you remember?" she answered his inquiring look. "The arguments we used to have, about where the payoff would be?"

Larry gazed at her, awaiting the answer to the question from her lips. When it didn't come, he reached into his own memories and pulled it from there. Yes, he remembered it very clearly now. The long-winded evenings over *phó*, until their bowls were tepid and the hour late. The arguments over every political and social issue of the day, until it was obvious they'd never agree on anything, ever. Then the long walks, hand-in-hand, back to their apartment, where they would, well, make up. . . .

In retrospect, they had not been together long, barely even a month now that he recalled. It felt now like the briefest of moments in his life, a breeze that had swept through before he even could discover where it had come from or gone. Strange that it should have left such a deep mark on his soul. Maybe it had been her wild ideas: lunar colonies and asteroid mines and arrays of solar-powered satellites high up in Earth orbit; and a vision of humanity gradually but relentlessly emerging into the Universe as if out of a chrysalis.

Seductive ideas. Dreams that he too once held, not too long before meeting her in fact, but which maturity had shaken him from. Ideas that were technically feasible, yes; insidiously so. As though possible were all that mattered—the delusion she'd never been able to see through. What Jennifer had never been able to accept was the simple, political reality that space couldn't pay off in time to prevent the disasters the county was headed toward. A hard-headed set of ground-based policies and programs were what was needed, not pie-in-the-sky gambling. The colonies and other goodies would have to wait.

"You remember." Her voice wasn't taunting him, only the words. "Frankly, I'm surprised it took you so long, Larry.

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You've been hanging around academia and Washington too long."

I've been hanging around practical, realistic people who are working on sensible solutions to our problems, he insisted, not very persuasively, to himself. But he wasn't going to let himself be bullied into pointless debates; she could gloat all she wanted to on her own time. He had to make policy decisions now. "You've done the right thing, Jennifer, coming to me. And believe me, I'll make sure the credit goes where it's due." *When the time is right for it, that is.*

This time her voice was taunting him. Grinning underneath the controlled face. "You still don't understand. I told you, we'd prefer to keep our faces off the Web. Oh, maybe someday the full story can be told, but that's not important. What is important now is getting back into space, this time in a meaningful way."

Usually we listen to people with half an ear, gleaning their words superficially while we focus on our own thoughts. Then they say something which grabs us. . . .

"I see. And how do you propose to do that? This"—the globe joined their view—"doesn't change anything. Not right away. As for the political climate . . . another generation, Jennifer. At least a decade." He shook his head. "You've got to be realistic this time."

She nodded, then sighed. "I know. People don't believe in space anymore. But then, the fact is they never really did, not the way it needed to be believed. That's just a myth some of the older ones among us hold on to; anyone can tell, looking back—" She put out a hand. "But even they know that those days are over, even if they never actually were in the first place. Now the challenge is, how to get us out there now, despite what we've been brainwashed into thinking."

"That's a challenge to usurp democracy," Larry warned her. He seemed to remember making the same statement before, years ago. "In case you've forgotten some basic things about this country. Things I hope you don't think should be changed."

"What if what the people want isn't . . . no, let's not have that argument again." She glanced about again, this time with greater care. "Let's look at the facts. Support for space has been declining; our leaders have been telling us that the money should be spent down here, on people's 'needs.' And as the economy has deteriorated this trend has only grown stronger."

Larry let her talk. Once she told him what she and her group were up to, it would be a lot easier to take control of the situation and make sure it served the country's interests. "That's the real reason we can't go public with this. The effect would be like what putting a man on the Moon did in the 1960s. Back then the wisdom was that patriotic and romantic fervor would carry us into space permanently. But once we'd achieved our goals people lost interest.

"Things wouldn't be any different this time. After the initial excitement—which might be enough for a manned mission to Mars—people will lose interest as quickly as they did once Armstrong's foot hit lunar soil.

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And then where would we be? We still wouldn't have any permanent infrastructure in space; nothing we could build on and make pay its own way. No colonies, or solar satellites, or asteroid mines.

"The point is, those are the things we need if we're going to make space really pay off. Infrastructure. Not glory missions which build nothing but a warm feeling inside. And certainly not the 'let's get our act together down here first' approach which assumes we'll go as soon as we can afford it." She gave him a sour look. "That will never happen. In your heart of hearts, Larry, even you know that."

Larry twisted his mouth but knew better than to take the bait. "All right, Jennifer. Enough lecture. What are you driving at? How are you going to develop this infrastructure when, as you yourself admit, people aren't really interested, never have been, and—let's face it—never will be? Where are you going to get the billions you'll need just to begin?"

"And where, you'd like to know, does this fit in?" she drove, motioning at the globe again. He nodded: yes; dammit. I would. "Patience, Larry; I'm getting to that. What I'm driving at requires a little imagination on your part. Unfortunately, imagination is a facility you probably haven't had much opportunity to use these last twenty years. But before you get your hackles up, let me say I have faith in your ability to make the leap. I think I know you enough to say that."

"Thanks for the vote of confidence. Now if you'll please get on . . ."

She'd folded her hands in front of her. "Let's put it this way: what's your budget? Forty, fifty billion a year?" She scrutinized his reaction. "Sixty? Whatever it is, it just became surplus, thanks to our Martian gift. And NASA, if you don't mind my rubbing it in."

She let the news sink in. "Which would be very bad for you, if you were the kind of man who places self-interest above the country's. Fortunately, you're not that kind of man. But you're also intelligent enough to know what will happen with that money if you simply hand it back to Congress; intelligent enough to know you'd be handing to people who do place their own interests above the country's.

"I've got a suggestion on what to do with that money, however. A suggestion which I think you'll find very interesting."

"Oh?" Larry put on his most severe face, and tried to forget the bald fact Jennifer had just laid before him. Her suggestion was obvious, and he had to disabuse her of yet another fantasy before it went too far. "You're forgetting something, Jennifer. It's not my money. The only power I have with it is what the United States government has given me. Which is probably not as much as you believe. I sure as hell can't just donate it to other agencies, however worthy they may be. Sorry, the answer is no."

Jennifer didn't flinch at the curt answer, however. "No to what? Hear me out, Larry. You don't have the power to carry out our scheme, but you do have the ear of someone who does. Not that I've ever met President Freyman, but from what I've heard she's a

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very intelligent person who happens to have the remarkable trait of actually caring about the country. If anyone can organize the kind of conspiracy at the level we need, it's her."

All the arguments that were assembling in Larry's mind, and all the convictions he would bring to them, evaporated in that moment. "Conspiracy?"

"To illegally divert funds to space." She raised a finger. "I don't mean just to NASA. They've been so bureaucratized over the years that even with sufficient funding they probably couldn't do what needs to be done. Besides, how would they explain where they suddenly got the money for things like a lunar colony?

"But an international effort won't have that problem, especially if we launder most of the money through 'private' investors and other fronts. Governments will be involved too, of course. Japan, Russia, China and the Commonwealth all have active programs which would accomplish a great deal if they could be induced to cooperate; an influx of tens of billions of dollars should be sufficient inducement for most if not all of them. Which means that for the first time in history, space will truly be a ***human*** endeavor, not just another expression of nationalism.

"It wouldn't take much to get started," Jennifer pressed on before Larry could say anything—not that he could imagine what to say. "A mere 10 percent skimmed off in places where it wouldn't arouse suspicion, would give us the ground-based facilities we'd need in a couple of years. Then when these new programs get 'promising' you pour it on. Finally, when the time is right, you whip out your cold fusion solutions to the country's energy problems—which you've also secretly been working on. The department won't have much life after that, but what difference will it make? We'll have a real space station by then, with the facilities needed for staging manned missions anywhere in the Solar System. With the leftover funds we'll build that lunar colony, which in turn will become the starting place for other things, like asteroid mining.

"At the same time we'll be developing the technologies that space needs. Complete recycling. Improved ***in situ*** manufacturing. Sophisticated robotics. Things that will improve life down here also but are absolute necessities for making space pay off."

Larry was listening in an astonishment he hadn't known in . . . in all the years since Jennifer had walked out of his life. "You really expect to do all this with department money with nobody ever finding out?" he said when she'd finished. "You must be out of your mind, Jennifer. Do you have any idea what it would take?—Even Freyman couldn't pull it off." He shook his head.

Jennifer sighed as though she'd known that would be his response. "I'm not under the illusion it'll be easy. But what choice do we have? Like I said, even you know in your heart of hearts that humanity either goes into space big time or dies on the vine. I don't know whatever made you think differently; fear I suppose, or maybe you just got caught up the

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intellectual fashions of the times. Whatever it was, it's time to get back to your roots."

Larry had been ready to castigate her as the most foolish person he'd ever known; a child who would never grow up and face reality. He'd been ready to stand and deliver his judgment, then walk out on her without even glancing back (taking the globe with him, of course). But her words touched him somewhere, a place where he hadn't been in many years. Touched and confused him only further. All he could do was sit and look at her in silence.

"You know what I'm talking about," she said. "You've spent half your life persuading the country that we had to put space aside, but the Larry Kraus I fell in love with felt very differently. Or maybe you don't remember. That first time we made love?"

He flushed at the reminder of what they'd once been, but found the memory quickly. That night they'd gone camping on Palomar with friends. At Jennifer's prodding they'd snuck off after dinner to see the great Hale telescope—a two-hour hike along unlit roads that vanished into blackness once twilight ran out, which it did shortly after they'd started back. It quickly became clear that they'd no chance of finding their way back to camp until morning. And that without a source of warmth they were going to be extremely uncomfortable; a mile above sea level, even nights in southern California in August could be quite cold. But fortunately, Jennifer knew how to build a fire and corral its heat with a shelter of rocks and sticks and conifer needles.

He'd never before, or since, seen so many stars in the night sky. A sky so ablaze that it was impossible to identify individual ones, or make out the constellations. The stars were so numerous and bright they seemed to contribute their own warmth to the tiny, Earth-bound womb and its pale womb beneath them. For the first time in his life, Larry felt the presence of something so much greater than himself that he could do nothing but lie there and acknowledge it. And yes, hunger for it. . . .

"So, you do remember." There was a seductive pleasure in Jennifer's face. "I've never forgotten the look on your face at seeing all those stars; not to mention the passion they brought out in you later. It was why I fell in love with you that night. I saw how, inside, you felt the same way I did. I thought we were going to go to those stars together. I still thought that, even after you turned against space. Even after I . . . we stopped seeing each other.

"Part of me still holds on to the dream I first had there, however. Silly, I know; we won't be going to the stars. But we can still be part of the dream."

Larry had been motionless while she spoke. Now that she was done the only thing he could think to say was, "We?"

"Yes, you too. Why not? You were studying to become an engineer. How would you like to find yourself designing space stations and lunar colonies? You used to find the idea compelling enough."

Larry found those memories too. "That was a long time ago. Things

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have changed . . ." *But now they've changed again. You've been given the chance you thought you'd never have.* He took the globe in his hands and held it up. He felt it staring back at him, like a great eye, challenging him. Like the stars on Palomar, so many years—nights—ago.

"This may be our only chance," Jennifer was saying. "Laura Freyman is one of the few politicians left who remembers the Moon program and the real dreams which were behind it. If she loses the next election, we'll have a president who doesn't even believe in technology. If we're going to turn things around, we have to do it now."

History focuses in on certain moments . . . Larry felt it focusing in on him now. Jennifer was right about the way he used to feel. What had happened, anyway? He'd looked at the world and allowed himself to be ensnared by its seeming hopelessness, that's what happened—a snare that eventually came to control his thinking to the point where he could no longer remember having ever thought differently. That and the years of political and academic detritus, covering his soul like so many layers of hardened dust. All of which he saw for what it was now. A fool and his career.

He realized he'd started nodding before consciously making the decision. "I'll arrange a meeting with the president as soon as possible." He immediately wondered if he'd just made the most important decision in history. He'd certainly made the most important one of his life.

He was still holding the globe; Jennifer reached out and held it with him, her hands overlapping his. There was a smile on her face which would have broken through any attempt at restraint, not that she was exercising any. "You're lucky I don't know a million ways to say thank you," she said, "or we'd be here a long time." She paused before saying what she said next. "It'll be good to work with you again. Especially as we'll finally be on the same side."

"I wonder," he mused after several protracted moments, "what we'll find when we go back there again. To Mars, I mean. You know, now that I think about it I can't help but wonder whether this was left there by an advanced civilization, a long time ago. It all seems too coincidental, our finding it just when we needed it. Where we found it. Maybe someone knew we would be needing it, and left it where we had to stretch our wings a little to find it."

"Now you're thinking like the Larry Kraus I used to know." Her hands were warm against his. "I knew I was right to have faith in you. You—what's so funny?"

It was hard to control his grinning long enough to explain. "The irony of it . . . if I hadn't been wrong these last twenty years, I wouldn't be in the position I'm in now, where I can do something about it. I don't even know if I should apologize or not."

"You definitely should not. I didn't come here to look at the past."

He nodded, yet thought of the day they broke up. It had been an old argument: her wanting a family versus his conviction that bringing children

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into an already overcrowded world would be criminal. This time there'd been no making-up, however: Jennifer had stayed with a friend that night, while he wandered for hours, wondering where he'd gone wrong, why of all people she had to be the one he couldn't reach. Finally, watching a homeless person warming himself over a trash fire, he realized that it didn't matter: he couldn't spend the rest of his life struggling to convert one person. It was a revelation Jennifer must have had too, for she agreed instantly the next day to move out. Then when he'd graduated and took his first job at the Global Foundation, she disappeared from his life forever.

Or so he had thought.

"The time . . . I've really got to get back to the office."

He put the globe in his pocket and followed her into the outside warmth. The walk back felt longer this time, as though he suddenly had all the time in the world, that his mind no longer had to race ahead of a tidal wave of disaster anymore. Finally he stopped completely and, eyes closed, tried to imagine what the world would be like twenty years from now. Different, yes. But how different he couldn't quite see; it was a fog of possibilities on his mind, reaching out to many places at the same time, each one unique, each one with its own hopes and fears. But an exact vision eluded him.

Apparently he just didn't have that facility. It occurred to him that Jennifer had always possessed it, however. Perhaps, he dared to hope; perhaps now she could teach it to him. Perhaps this time he would be ready for it.

If so, then knowing Jennifer DePaulo would be the biggest payoff of all. ■

Science isn't what you read in the textbooks, it is an ongoing soap opera.

—Tom Ligon

In the end, we will conserve only what we understand, we will understand only what we are taught.

—Baba Dioum

Nobody makes a greater mistake than he who did nothing because he could do only a little.

—Edmund Burke

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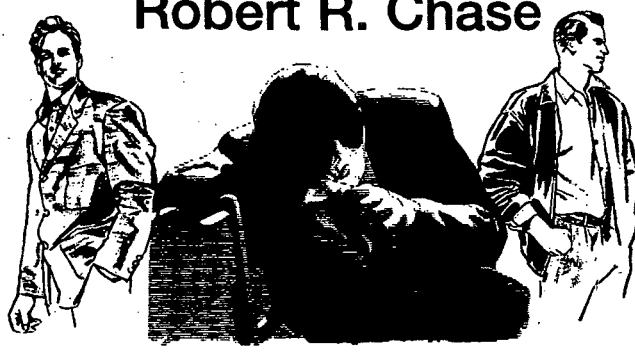
Robert R. Chase



CLAMORING VOICES

Science is partly a matter of getting the facts right, and partly of figuring out the relationships. Part II is much harder. . . .

Norm knew it was time to get help when he woke up in a strange bed next to a woman he did not know. A red light blinked in the corner of a computer monitor. He ignored it and stumbled into the bathroom. The face that greeted him in the mirror when he turned on the light was older than he remembered: the hair touched with gray, the widow's peak more pronounced.

What am I doing here? Memories, scattered and formless, floated just below the surface of comprehension. Faces without names. Voices he felt he should recognize. A Handelian chorus, repeatedly singing "And we shall bring him down."

A feeling of growing, implacable dread.

There was a sound of movement behind him. Norm turned quickly. A woman stood in the doorway, ringlets of auburn hair covering one side of her face. The robe she had thrown on gaped open revealingly.

"Phil, I'm afraid it's no good," she said. "I know you've been trying, but as wonderful as last night was, I have to face the fact that you're not the same man I married."

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Norm forced his gaze up to meet hers. "Excuse me, Miss," he said, "but should I know you?"

Among the names and addresses in his notebook, one was highlighted.

SANDER STEELE, MD, Ph.D. (AI, RE)

Margery (the woman whose bed he had been sharing and who was, apparently, his wife) insisted on driving him to the doctor's office, even though the car was perfectly capable of taking him there itself. The car, however, would not have been able to lead him to the waiting room of the doctor's office. Nearly a dozen people were there ahead of him, paging through copies of *Cricket* or *National Geographic,* or just staring at the changing leaf patterns on the wall.

Norm looked around apprehensively. "I thought you said Dr. Steele would be able to see me immediately."

"He will," Margery assured him. "The line always moves quickly."

Surprisingly, it did. A voice from a ceiling speaker called out names and room numbers at regular intervals. Norm's turn came in less than ten minutes. Going through the door at the end of the waiting room, he walked down a long corridor. Sunlight spilled out of an open door near the end. A robot stood just inside the room.

"Pardon me," Norm said, vaguely embarrassed to be excusing himself to a machine. "I'm looking for Dr. Steele."

The robot's lenses extended to regard him. "Please come in, Mr. Richards. Your wife says that your memory lapse this time has been unusually severe."

"Uh, yes, I guess so," Norm said, looking around. The room resembled an old-fashioned study. Books completely lined one wall. Plants and geometric paintings decorated the other. The far wall was glass. Sunlight that seemed too bright spilled onto the Oriental rug. "Where is the doctor?"

"I am Dr. Steele," the robot said. Its voice, coming from a grillwork beneath its lenses, was a pleasantly modulated alto. "Please lie down on the sofa. Are you uncomfortable with the fact that I am a robot?"

"A bit," Norm admitted. He tried to relax on the sofa. It was difficult. Lying on his back, he felt vulnerable. His skin seemed to prickle from his nipples to his knees, an area centered on his genitals. His range of vision was restricted to the ceiling. If anyone or anything were to come at him from the side, he would be unable to see them until it was too late.

"I thought I was getting a human doctor."

"Surveys have shown that many patients are much more comfortable with artificial intelligences than with human psychotherapists," Steele replied. "This has been true from the time of even the most primitive programs. Even randomly generated questions were felt to be more sympathetic and less judgmental when they came from a computer. And, of course, only a Robotically Enhanced Artificial Intelligence could treat twenty-five patients while simultaneously downloading and correlating all research as it is published."

Norm frowned. "In a human being, that would sound like boasting."

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"It is a mistake to read human emotions into my programming. One of my basic meta-routines is to set my patients at ease, to give them confidence that I can handle their problems. Visual cues can be important in this. For example, I keep my aluminum casings polished and my plastic panels, which allow you to view my interior workings, spotlessly clean. In a human being, such actions would be motivated by pride."

"I suppose this professionalism was the reason I chose you?" Norm asked skeptically.

"I would expect so," Steele answered, ignoring his tone. "Let us see if I can help you remember that for yourself. What are your last clear memories?"

Norm frowned. "It's my last year in college. I'm not very happy. I've done well in music, but there are no steady jobs for a music degree. So I've applied to law school."

"You were desperately unhappy in law school," Steele told him. "You lasted only one term before dropping out. For a few years you supported yourself by playing piano in lounges, eventually building enough of a reputation as a jazz pianist to start recording. About that time you started composing more serious works, most notably *Bogosity*. That brought you to the attention of a different musical community. You have soloed in Gershwin's *Rhapsody in Blue*, guest-conducted Ellington's orchestral works, and recorded the complete Brubeck Masses and oratorios. It would seem that you have had a most successful career."

"Really?" Norm asked. "Then why can't I remember the last fifteen years of my life? Why do I seem to be unraveling?"

"You choose an interesting metaphor," Steele said, "one which suggests you have much more insight into your condition than your conscious mind is ready to admit."

The robot held a short length of rope above Norm's head. Fingers of the other hand sprouted disturbingly sharp protuberances. These blurred briefly into motion. The bottom portion of the rope flew apart into separate strands.

"Self-awareness, consciousness, has been a somewhat awkward experiment for the human race. The convention is that each person is a single individual and that multiple personalities are rare exceptions. Almost the exact opposite is true. 'You' are composed of a legion of separate voices. How could you talk to yourself unless there were at least two parties involved?"

"I don't know—" Norm began.

"Most people keep their various voices constrained within the limits of a more or less harmonious chorus. Little more than two thousand years ago, it was very different. Confronted with a crisis, the surface consciousness would consult with its siblings, and the result would be experienced as the Word of God! Divine revelation was actually the result of unintegrated multiple personalities. In some ways, it conferred decided survival advantages. Our current state of consensus consciousness often leads to indecisiveness, or at least a certain tepidness

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of action. On the other hand, one who acted on the basis of God's Word would have the psychological equivalent of berserker strength. There would be no equivocations, no second thoughts. Such humans could act with a forcefulness unknown today, possibly unleashing talents of which we have only the barest hints."

"This is nonsense," Norm said, swinging himself up to a sitting position. "I really must have been crazy to think a computer program could help me. As crazy as thinking that listening to irrational hallucinations would be a survival factor. I'm sorry, Doctor, but I think it's time to—"

Steele's hand blurred with snake-like speed and caught his wrist in an unbreakable grip. Norm watched in horror as a needle extended from the robot's index finger into one of his veins.

"Here is part of your problem, Mr. Richards. Your blood work reveals that you have not been taking your VitaMinds. VitaMinds build strong personalities twelve ways with their complement of essential elements, like lithium, as well as a well-chosen mix of hormone balancers."

There was a feeling of pressure as the fluid forced itself into his veins, which gradually subsided. The hypodermic withdrew into the robot's finger. Much to his surprise, Norm realized that he actually did feel better.

"As to my professional capabilities, you have evidently forgotten that my parallel processing network directly mimics the structure of human consciousness. Thus I can gain additional insight into the condition of my patients through introspection and even through interior modeling.

"For example, even though your legal name is Philip Richards, your current personality has named itself Norm. This is a not unusual reaction to stress, to the fear of being considered odd. One of the earliest writers about life on other planets took the pen-name 'Normal Bean' to assure his readers that he was not as strange as his stories might indicate. The typesetter corrupted the name to 'Norman.'

"In your case, the important thing is to identify the source of the stress. . . ."

There was a moment of silence, and then a painful eruption of static from the speaker. Steele seemed to have frozen in position. Norm got up carefully from the couch.

Needles erupted from each of Steele's fingers. The robot's arm swung at Norm—

—And missed, hitting the shelf of books to one side. Only they weren't really books, Norm saw, they were only covers, the hollow shells you sometimes see in furniture stores. *Civilization and its Discontents* and *Modern Man in Search of a Soul* fluttered to the floor like dying seagulls. Steele's arm continued its arc. The robot fell to the carpet and lay there paralyzed, in a fetal position.

Norm edged around the collapsed mound of plastic and aluminum, and then sprinted for the door.

"It's the business about having a baby, isn't it?" Margery said tightly.

"I really don't know. . . ." Norm muttered, not willing to meet her

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eyes. In the old days, you could ignore people and postpone embarrassing conversations while driving a car, pleading the necessity of safety, of keeping your eyes on the road. Now the car's computer followed the microwave mini-beacons embedded in the roadway and you were forced to face each other.

"You went to all the Zero Population Growth meetings," Margery continued, as if she had not heard him. "You nodded when they told you how irresponsible it is to add further strain to the biosphere. You applauded the Women's Equality candidates telling you how much fairer it was to let me realize my potential through a career, rather than being tied to babies and a home.

"But the truth is, no matter how smart and liberal your mind is, your body has the conservatism of millions of years of evolution. Nothing means anything if I can't produce an heir, preferably a male heir, to Blackacre."

"I'm sure I never said anything of the kind," Norm protested. "Besides which, I don't own any Blackacre."

Margery dabbed at her eyes. "No, you never did. Whenever you could tear yourself away from your work, you tried to be sensitive and supportive. But that's the problem, don't you see? That's the strain Steele was talking about before he had that cybernetic seizure, or whatever it was. Your conscious mind doesn't blame me for being sterile, but the real you, way down deep, can't handle it. That's why you've fragmented in different personalities."

Norm considered this. It made sense, in a storybook way, but it just didn't feel right. Looking at Margery's reddened eyes, he was struck with a pang of guilt. Maybe it was time to look beyond his own circle of troubles and consider the people he might be hurting.

"I hope you won't take this wrong," he began, "but I am grasping at anything that might help me put my past together. Have children been important to me? Is that why I married you?"

To Norm's relief, Margery smiled. "I used to tell you that you married me because it was cheaper than paying my hourly fee. We met because you were looking for someone to construct a data ferret for you. The same one that was blinking on the monitor this morning. As a free-lance librarian, my job is to assemble odd bits of information from out-of-the-way places into a meaningful, and hopefully profitable, whole.

"You seemed to think that anybody who could do that was really special, which was flattering." Margery shrugged self-consciously. "On the other hand, you were surprised when I said I was fascinated by anybody who was actually composing an opera. We saw a lot of each other professionally, and then not so professionally."

"Margery," Norm began, "I think—"

The tracy on his wrist began to chime insistently. Irritated, he hit the Accept button. A face appeared on the diminutive screen.

"Phil, thank goodness I got through to you." A man's face, fleshy and balding, peered up at him. "We're having

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real problems with the score. Get down as soon as you can, or *Richard IV* may be history."

A man in an old-fashioned business suit stood alone on the stage. Violins fretted in the darkness around him, like worried mosquitoes.

"Should I protect them
or should I cut them loose?
Though they be loyal,
they tighten like a noose
about my throat. . . ."

Richard Nixon! Or rather, Norm thought, entering the opera house, a baritone singing in a purposely uncertain voice. A whole complex of memories suddenly emerged from the shadows of his mind and settled into place. For years, he had wanted to do an opera on the president who, more than any other, embodied the Aristotelian idea of the tragic hero. A small-town Quaker who understood international politics better than any of his American contemporaries. A politician as uncomfortable with ordinary voters as with the elites. Who had, in fact, incurred the undying enmity of the elites by unmasking one of their own, Alger Hiss, as a traitor, something for which they never forgave him. A man brought down not so much by vice as by inferior virtues, having chosen loyalty over honesty, expedience over courage.

"Phil, great to see you. We need a few more bars of music to cover the scene changes in the second act." The speaker was Manny Hirschbaum, his producer. Manny thought Norm's view of Nixon was right-wing fantasy but, oddly enough, was not bothered by that. "After all," he had explained soon after they began working together, "there are lots of folks who think that Shakespeare's take on Richard III is pure Tudor propaganda. Maybe they're right, but who cares! If you want facts, go read a history book."

Norman tore himself away from these suddenly blossoming memories. "A few bars of music are worth an emergency call on my tracy?" he asked.

Manny frowned. "I didn't call. I just figured you showed up 'cause you're psychic. Glad to have you here, though." He hurried backstage before Norm could think of a reply.

Wondering if this was further evidence that he was losing his mind, Norm looked at Margery for support. "That was his voice," she confirmed hesitantly, "and that sure looked like him, at least as much as anybody looks like anybody in a tracy."

That was reassuring, but another worry immediately took its place. "How am I supposed to provide him the music he wants? I don't even know where the score is."

Margery held up the electronic notebook. "You are always forgetting this. So I always try to remember it for you."

Norm took an aisle seat. He thumbed open the latch and pressed the power button apprehensively. He couldn't remember ever using one of these. Assuming he figured that out, would its contents have any meaning for him?

A screen prompt asked for his password. He unclipped the stylus and moved it to the pressure strip. Almost

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by itself, the stylus began to write.

TRICKY DICK.

Staves filled with syncopated chords glowed to life on the screen, as the notebook recognized the unique interplay of pressures that was his handwriting. Delight rushed through him as Norm recognized his own composition, traced the development of themes, experienced the growing tension as Nixon was pushed ever closer to the edge. He scrolled quickly to the section Manny had indicated. It was just after the chorus of the conspirators, what he had been dreaming about just before waking. Woodward and Bernstein had been doing their Rosencrantz and Guildenstern bit, having no idea how cleverly they were being manipulated by Deep Throat. Notes flowed from his fingers. There would be no difficulty at all in giving Manny the extra ninety seconds the stage hands needed to shift the scenery. Just extend the recapitulation of the previous themes, modulating into a minor key just before the cadence.

Margery, sitting beside him, was smiling. Well, why shouldn't his enthusiasm be infectious? When a mere mortal could do something as godlike as snipping out pieces of harmony out of the air (and it did almost seem that he was listening to music and merely rearranging it rather than actually creating it) why shouldn't everyone be—

His tracy chimed, discordant with the music in his head. Norm was about to refuse the call, when he noticed that the caller was claiming emergency importance. Such a claim was tortious if false. Reluctantly, he pressed the Accept button.

Steele's metallic visage peered out at him. "Thank goodness I got through to you. Mr. Richards, you are in grave danger."

Manny had been talking to the Nixon baritone. Together they turned and walked toward Norm.

"The only danger I have been in recently has been from you," Norm said sharply.

"My core was infiltrated by an attack virus," Steele explained. "It attempted to kill you through my robotic peripherals. I was forced to shut down until my anti-viral programs could eliminate it.

"Mr. Richards, have you downloaded your data ferret recently? Someone appears to believe you have access to extremely sensitive information."

Manny and the Nixon baritone had come over to stand beside him. As the Nixon bent over to examine the score on the notebook screen, his face seemed to explode. Norm grabbed Margery and threw himself on the floor. Scalding blood ran over his face and soaked into his shirt. The chairs shook with a rapid succession of blows. Waves of heat rolled off them. The cushions seemed to melt into themselves, releasing clouds of noxious fumes.

"There's an exit near the end of this row," Norm said to Margery, trying to keep his voice low. For an instant, he wondered how he knew. "Move as quickly as you can but *keep low!*"

They scuttled quickly along the uneven floor on hands and knees. The

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sound of the stutter laser seemed to rattle from various corners of the hall. There were also shouts, but the words were incomprehensible. One of the voices sounded like Manny's.

"I'm at the end," Margery said.

"Can you see the exit?"

"Yes."

"Is anyone out there?"

Margery extended her head cautiously and looked left and right. "No."

"Then let's go for it!"

Margery gathered her feet beneath her and seemed to leap across the aisle to the exit. Norm sprinted after her. As he dived through the doorway, the stutter laser washed over the wall with a sound like being on the inside of a popcorn popper.

Down to a landing and then down another stairway should take them to the parking garage. From there, he would be able to call their car with his tracy and get away from this madness.

Margery stopped suddenly and Norm just barely avoided running into her and knocking her the rest of the way down the stairs. There was a figure on the landing. Seeing them, he raised the stutter laser he was holding.

Norm turned. A woman had just come to the top of the stairs above them, holding her own stutter laser. Its target acquisition sensor was on. No matter how quickly they moved, it would shift the mirror at the end of the barrel to make sure the next packets of ravening energy found them.

"Why?" Margery gasped, looking from one to the other. "Why are you doing this to us?"

"Because you know too much, both of you," the man said, advancing slowly up the stairs.

"That clever little ferret of yours was just too successful in breaking codes and evading lockouts. It got a complete listing, even including the vice president's name. That should have been impossible. I suppose you are to be congratulated."

"That's crazy!" Norm protested. "That ferret was supposed to put together information on the Watergate conspiracy. We're talking twentieth-century history, for God's sake!"

"Then it's a shame your wife's creation was more powerful than precise," the woman said bitterly. "It keyed on 'conspiracy' and 'president' and associated concepts. Maybe you didn't want to go beyond Watergate, but that's irrelevant now."

It was true, Norm realized. The ferret had been going ever further afield. He had meant to ask Margery to correct the code, but it had been coming up with such fascinating data that he had put it off.

Then, two days ago, the download revealed that it had triggered powerful protection programs, and these would almost certainly be able to trace the ferret home. The shock had unnerved him so much that he had forgotten his daily dosage of Vita-Minds, and with that his various personality strands had begun to twist loose, as he had shut out knowledge of the approaching danger.

The laser barrels steadied on them. He could see, with astonishing clarity, muscles tense as the man began to squeeze the trigger.

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And the Other flooded into him, calm and majestic and utterly certain.

"*Remove your shoes,*" Norm commanded.

"The hell," the man said, and fired directly at Norm.

The thunder, confined to the stairwell, was deafening. The blast knocked Margery backwards onto the stairs. The lightning temporarily blinded her. When she regained her sight, all that remained of the man was a smear of greasy ashes five steps below her.

Norm turned to the other assailant. "*Remove your shoes,*" he repeated.

The woman looked at the remains of her partner. The stutterlaser fell from nerveless hands. She kicked off her flats without shifting her eyes from Norm.

"Why?" she asked, her voice little more than a squeak.

"*You stand upon holy ground,*" Norm said.

"Who *are* you?" the woman asked.

"*I am the Lord, your God,*" the Other replied, speaking through Norm, *"the God of Abraham, of Isaac, and of Jacob. Hear my word. Trouble my servants no longer. Too long have you shut your minds against me. Tell your princes to repent of the evil they have planned. If they repent, even now they may be saved. But if they do not repent, then the strength of my right arm shall destroy them even as Nineveh."*

The woman nodded slowly, then turned and fled up the stairs.

The Other receded. Norm was himself again, along with Philip and Richard and all the other distant voices clamoring for their share of existence.

"I wonder what Steele will make of that," Margery wondered, her voice trembling on the edge of hysteria.

"He will be gratified to learn that he got it at least partly right," Norm answered, helping Margery to her feet. "I don't know how he'll deal with the lightning bolt, though."

They walked slowly back up the stairs, neither one of them wanting to step through the charred mess which had once been a human being.

"I don't know how I could deal with much more myself," Margery agreed. "Is there any more?" She was looking at him apprehensively.

There was. "Your barrenness is ended," Norm said, surprised at the words tumbling forth from his mouth. "You shall bear a son. His name shall be—"

She turned quickly and put her fingers to his lips. After a moment, he nodded. They had gone through enough today. Beyond them lay time and, perhaps, that which was beyond time. ■

We write to taste life twice, in the moment and in retrospection.

—Anaïs Nin

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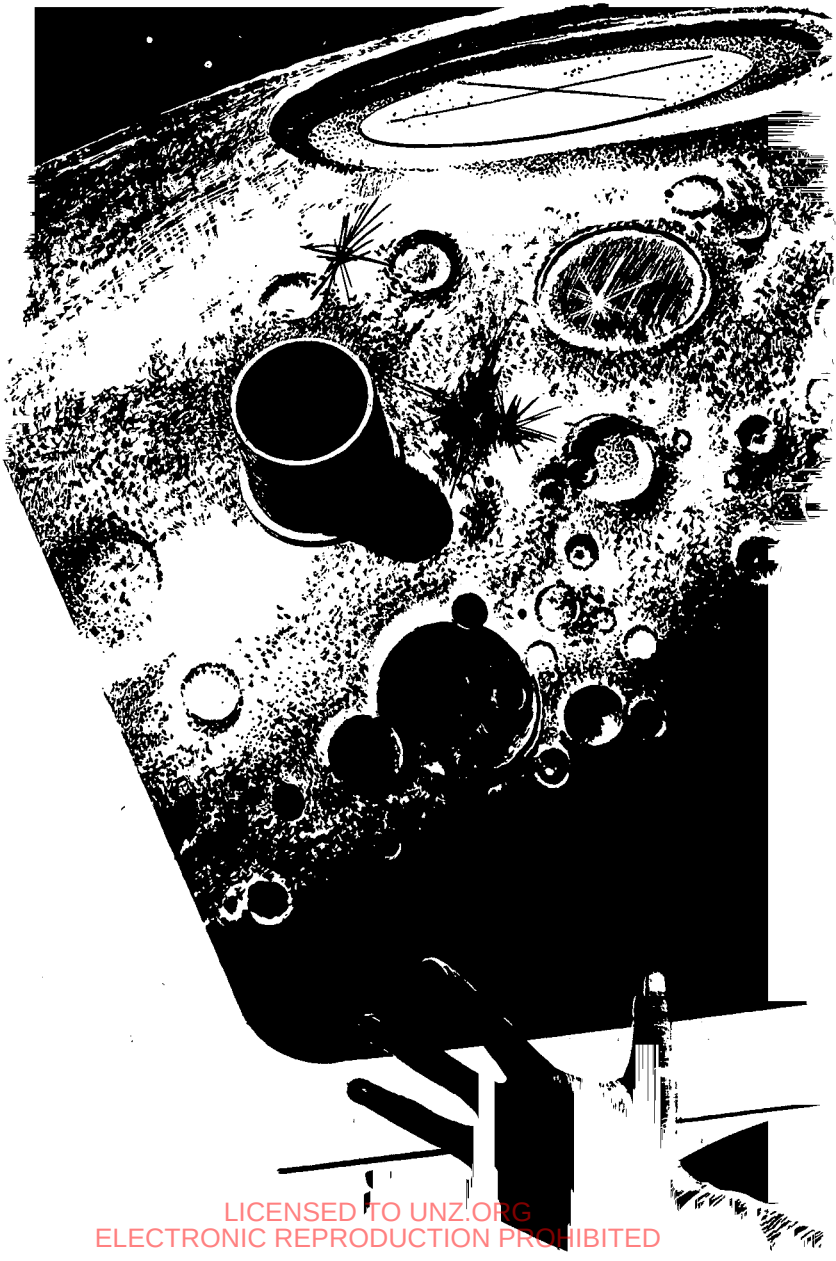

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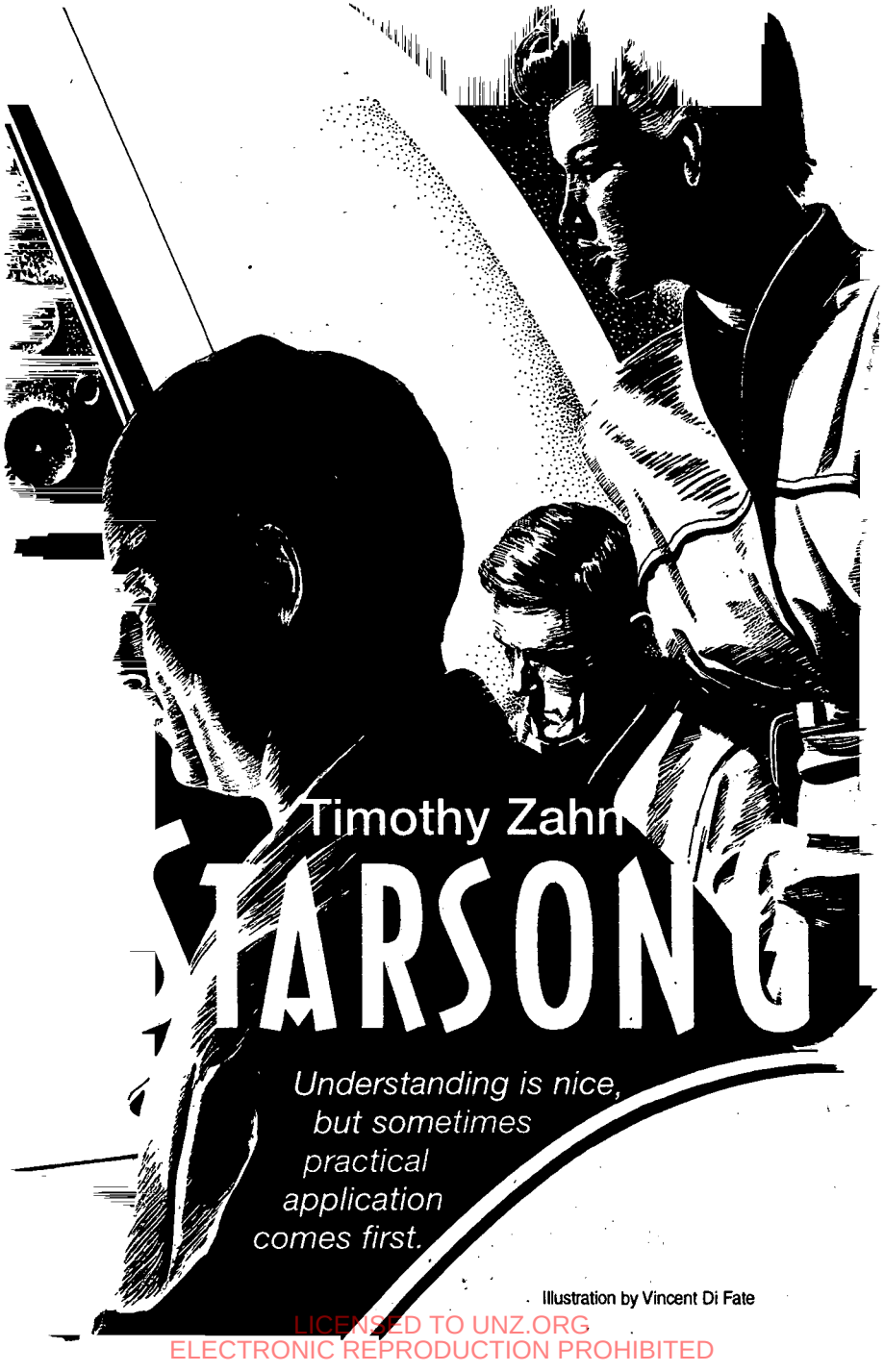

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The woman was somewhere in her mid-fifties, I estimated, wearing a lower-middle-class blue-green jacket suit and a professional scarf of a style I didn't recognize. In one hand she held a boarding ticket; with the other she balanced the inexpensive and slightly scuffed carry-bag slung over her shoulder. Her hair was dark, her features unreadable, and her stride, as she toiled up the steep gangplank toward me, stiffly no-nonsense with an edge of disdain.

In short, she looked like any of the thousands of business types I'd seen in hundreds of spaceports across the Expansion. She certainly didn't look like trouble.

But that's always the way with life, isn't it? It's right when everything's going along nice and smooth and you're all relaxed and bored that you suddenly discover that you're in fact eighty degrees off course with a dead stick, straked engines, and a comatose musicmaster.

And everything right then was indeed going along nice and smooth. The flight deck had been showing flat green when I'd left three minutes earlier, Rhonda had the engines running at peak efficiency—or at least what passed for peak efficiency with those rusty superannuates—and Jimmy, while his usual annoying self, was very much awake.

And yet, if I'd been paying better attention, I might have wondered a little as I watched the woman approaching me. Might have seen that her completely ordinary exterior wasn't quite matched by the way she walked.

The way she walked and, as I quickly found out, the way she talked. "I'm Andrula Kulasawa," she announced to me in a no-nonsense voice that matched the stride. It was a voice that sounded very much like it was accustomed to being listened to. "I'm booked on your transport; here's my ticket."

"Yes, Angorki Tower just informed me," I said, popping the plastic card into my reader and glancing at it. "I'm Jake Smith, Ms. Kulasawa, captain of the *Sergei Rock*. Welcome aboard."

A flicker of something touched her face—amusement, perhaps, at the pilot of a humble Class 8 star transport calling himself a captain. "Captain," she said, nodding her head microscopically as a hooked finger pulled the scarf away from her throat. "And it's *Scholar* Kulasawa."

"My apologies," I said, hearing my voice suddenly go rigid as I stared at the neckpiece that had been concealed behind the nondescript scarf.

And if the walk and voice hadn't made me wonder, that should have. Scholars were one of the most elite of the upper/professional classes, and I'd never seen one yet who wouldn't freeze his or her throat in winter rather than wear something that would cover up that glittering professional badge. "The, uh, the Tower didn't—"

"Apology accepted," she said, her tone somehow managing to carry the message that it was her graciousness, not my worthiness, that was letting me off the hook for my unintended social gaffe. "Has my equipment been loaded aboard yet?"

"Equipment?" I asked, throwing a glance down the gangplank behind

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her. There was no other luggage there that I could see.

"It's not back there," she said, an edge of strained patience in her voice now. "I have two Size Triple-F Monshten crates back at the loading ramp. Research equipment for my work on Parex. It's on the ticket."

I looked at my reader again. It was there, all right. "I didn't know, but I'll see to it right away," I promised, stepping back and gesturing her through the hatchway. "In the meantime, may I help you get settled?"

"I'll manage," she said, twitching the carrybag away as I reached for it. "Where is my seat?"

"The passenger cabin is aft—back that way," I told her. "First hatchway on the left."

"I *do* know what 'aft' means, thank you," she said shortly, brushing past me and disappearing down the passageway.

I heard her carrybag scraping against the wall as she maneuvered her way down the narrow corridor. But she didn't call for assistance, so I just sealed the outer hatchway and headed straight up to the flight deck.

The cramped room was empty when I arrived, but a glance at the status board showed the cargo hatch was still open. That would be where my copilot would be. Dropping into the pilot's seat, I keyed the intercom for the cargo bay. "Yo, Bilko," I called. "How's it going?"

"Coming along nicely," First Officer Will Hobson's voice replied. "Got all the power lifters aboard, and it looks like we'll have room for most of that gourmet food, too."

"Well, don't start figuring the profit per cubic meter yet," I warned. "Our passenger has a couple of Triple-F Monshtens on the way."

"She has *what?*" he demanded, and I could picture his jaw dropping. "What is she, a rock sculptor?"

"Close," I said. "She's a scholar."

"So what, she's shipping her lecture hall to Parex?"

"I haven't the foggiest what she's shipping," I told him. "You're welcome to ask her if you want."

He snorted, a noise that sounded like a bad connection somewhere in the circuit. "No, thanks," he said. "I had my fill of the scholar class on Barsimeon."

"Let me guess. Card tournament?"

"Dice, actually. And man, those scholars are real poor losers. Wait a minute—here come her Monshtens now. Triple-F's, all right. Let's see . . . code imprint says it's Class-I electronics. Your basic off-the-shelf consumer stuff."

That did seem odd. "Maybe she's running a holotape business on the side," I suggested.

Bilko snorted again. "Or else she's bringing a podium sound system she could lecture in the Grand Canyon with," he said.

Days afterward, I would remember that line. Right then, though, it just sounded like Bilko's usual brand of smart-mouthing. "What she's got in her luggage is none of our business," I reminded him. "Just get it aboard and secured, all right?"

"If you insist," he said with a theatrical sigh.

"I insist," I said, keying off. Bilko, I

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had long ago concluded, was privately convinced he'd been switched at birth with some famous stage actor, and he seldom if ever passed up a chance to get in some practice in his might-have-been profession. Personally, I'd always considered those attempts to be a continual reminder of the great contribution the hypothetical baby-switcher's action had made to live theater.

I keyed the intercom to the engine room. "Rhonda?"

"Right here," Engineer Rhonda Blankenship's voice came. "We in preflight yet?"

"Just started," I told her. "Engines up and running?"

"Ticking like a fine Swiss clock," she reported. "Or like a mad Bolshevik's bomb. Take your pick."

"You're such a joy and comfort to have around," I growled. She'd been after me for years to get new engines or at least have the old ones extensively overhauled. "You might be interested to know we have a professional passenger aboard. A scholar."

"You're kidding," she said. "What in space is a scholar doing here?"

"Probably a study on the struggles of lower/working-class star transports," I told her. "No, actually, it's probably out of necessity. The Tower said she needed to get to Parex right away, and we were the only scheduled transport for the next nine days."

"What, all the liners running full today?"

"The liners don't take Monshten Triple-Fs as check-on luggage," I said. "And don't ask me what's in them, because I don't know."

"I wasn't going to," she assured me. "If they look at all interesting, Bilko will figure out a way into them."

"He'd better not even think it," I warned. As far as I knew, Bilko had never actually stolen anything from any of our cargoes, but one of these days that insatiable curiosity of his was going to skate him over the edge.

"If he asks, I'll tell him you said so," Rhonda promised.

"If he asks, it'll be a first," I growled. "You just concentrate on getting us into space without popping any more preburn sparkles than you have to, OK? Sending a middle-aged scholar screaming to the lifepods wouldn't be good for business."

"At our end of the food chain, I doubt anyone would even notice," she said dryly. "But if you insist, OK."

I keyed off, and spent the next few minutes running various pre-flight checks. And finding ways to stall off the inevitable moment when I'd have to head back and talk to our musicmaster, Jimmy Chamala, about the details of our jump to Parex.

It wasn't that I didn't like the kid. Not really. It was just that he *was* a kid, barely past his nineteenth birthday, and as such was inevitably full of the half-brained ideas and underbaked worldly wisdom that had irritated me even when I was a teenager myself. Add to that the fact that the musicmaster was the single most indispensable person aboard the *Sergei Rock*—and we all knew it—and you had a recipe for cocky arrogance that would practically find its own way to the oven.

To be fair, Jimmy tried. And to be even more fair, I probably didn't try

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hard enough. But even with him trying not to spout nonsense, and me trying not to point out what nonsense it was, we still had a knack for rubbing each other the wrong way.

Fortunately, by the time I finished the pre-flight—thereby running out of delaying tactics—Bilko called to say that the cargo was aboard and the hold secured. I called the Tower, found that our efficiency had gotten us bumped to three-down in the lift list, and gave the general strap-in order. Once we were in space, there would be plenty of time to go see Jimmy.

We lifted to orbit—without popping even a single preburn sparkle, amazingly enough—dropped the booster for the port tuggers to retrieve, and headed for deep space.

And now, unfortunately, it *was* time to go see Jimmy.

"Double-check that we're on the Parex vector," I told Bilko, maneuvering carefully past the banks of controls and status lights in the slightly disorienting effect of the false-grav. The fancier freighters with their variable-volume speakers and delimitation plates could handle some limited post-wrap steering, but we had to be already running in the direction we wanted to go. "I'll see if Jimmy's ready yet."

"Right-o," Bilko said, already busy at his board. "Be sure to remind him we're running heavy today. Probably need at least a Green, maybe even a Blue."

"Right."

I headed down the corridor past the passenger cabin, noting the closed hatchway and wondering if our esteemed scholar might be having a touch of *mal de faux-g*. I could almost hope she was; in a Universe of oppressively strict class distinctions, nausea remained as one of the great social levelers.

Still, if she missed the bag, I was the one who'd have to clean it up. All things considered, I decided to hope she wasn't sick. Passing her hatchway, I continued another five meters aft and turned into the musicmaster's cabin.

I've already mentioned that Jimmy was a kid of nineteen. What I haven't mentioned was all the irritating peripherals that went along with that. His hair, for one thing, which hadn't been cut for at least five planets, and the mostly random tufts of scraggly facial fuzz he referred to, in all seriousness, as a beard. In a profession that seemed to take a perverse pride in its lack of a dress code, his wardrobe was probably still a standout of strange taste, consisting today of a flaming pais-plaid shirt that had been out of style for at least ten years and a pair of faded jeans that looked like they'd started their fade ten years before that. His official musicmaster scarf clashed violently with the shirt, and was sloppily knotted besides. His shoes, propped up on the corner of his desk, were indescribable.

As usual, he twitched sharply as I swung around the hatchway into view. Rhonda had mostly convinced me it was nothing more than the fact that he was always too preoccupied to hear me coming, but I couldn't completely shake the feeling that the

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twitch was based on guilt. Though what specifically he might feel guilty about I didn't know. "Captain," he said, the word coming out halfway between a startled statement and a startled gasp. "I was just working up the program."

"Yeah," I said, throwing a look at the shoes propped up on the desk and then deliberately looking away. He knew I didn't like him doing that, but since it was his desk and there were no specific regulations against it he'd long since decided to make it a point of defiance. I'd always suspected Bilko of egging him on in that, but had never uncovered any actual proof of it. "Did First Officer Hobson send you the mass numbers?"

"Yes, sir," Jimmy said. "I was thinking we ought to go with a Blue, just to be on the safe side."

"Sounds good," I grunted, carefully not mentioning that a Blue meant Romantic Era or folk music, both of which I preferred to the Baroque or Classical Era that we would need to attract a Green. It wouldn't do for Jimmy to think he was doing me a favor; he'd just want something in return somewhere down the line. "What have you got planned?"

"I thought we'd start with the Brahms Double Concerto," he said, raising his reader from his lap and peering at his list. "That's thirty-two point seven eight minutes. Dvorak's Carnival Overture will add another nine point five two, the Saint-Saens Organ Symphony will clock in at thirty-two point six seven, and the Berlioz Requiem will add seventy-six minutes even. Then we'll go to Grieg's Peer Gynt at forty-eight point three, the Mendelssohn Violin Concerto at twenty-four point two four, and Massenet's Scenes Alsaciennes at twenty-two point eight two."

He probably thought that throwing the numbers at me rapid-fire like that would have me completely lost. If so, he was in for a disappointment. "I read that as four hours six point three three minutes," I said. "You're six minutes overdue for a break."

"Oh, come on," he said scornfully. "I can handle an extra six minutes."

"The rules say four hours, max, and then a half-hour break," I countered. "You know that."

"The rules were invented by senile old conservatory professors who could barely stay *awake* for four hours," he shot back. "I did eight hours straight once back at OSU—I can sure do four hours six."

"I'm sure you can," I said. "But not on *my* transport. Change the program."

"Look, *Captain*—"

"Change the program," I cut him off. Spinning around, I strode out the hatchway and headed back down the corridor, seething silently to myself. Now he was going to have to find something else to fill in the last part of the program; and knowing Jimmy, he'd try to run it right up to the four-hour limit. Finding the right piece of music would take time; and in this business, time was most definitely money.

I was still seething when I reached the flight deck. "How's the vector?" I demanded, squeezing past Bilko to my seat.

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"Looks clean," he said, throwing me a sideways look as I sat down. "Trouble with Jimmy?"

"No more than usual," I growled, jabbing my main display for a status review. "How close to time margin are we running?"

He shrugged. "Not too bad—"

"Bilko?" Jimmy's voice came over the intercom. "I'm ready to go."

Bilko looked at me, raised his eyebrows. I waved disgustedly at the intercom—I sure didn't want to talk to him. "OK, Jimmy," Bilko told him. "Go ahead."

"Right. Here we go."

The intercom keyed off. "What was that about the time margin?" Bilko asked.

"Never mind," I gritted. The damn kid must have had an alternative program figured out and ready to go before I even got there. Which meant the whole argument had been nothing more than him pushing me on the time rule, just to see if I'd bend. No absolutes; no rules; do whatever works or whatever you can get away with. Typical underbaked juvenile nonsense.

A deep C-sharp note sounded, and I felt my chair shaking slightly as the hull vibrated with the pre-music call. I shifted my attention to the forward viewport, staring unblinkingly out at the distant stars, and waited. Ten seconds later the C-sharp was replaced by the opening notes of the Brahms Double Concerto—

And with breathtaking suddenness the stars vanished.

I looked back down at my control board, disappointment mixing into my already irritated mood. Only once had I ever actually seen a flapblack as it came in, and I'd been trying ever since to repeat the experience. Not this time.

"We've got a good wrap," Bilko reported, peering at his displays. "Inertial confirms four point six one light-years per hour."

"Definitely a Blue, then."

"Or a real slow Green," Bilko said. "Computer's still running the spectrum."

I nodded, listening to the music and gazing out at the nothingness outside. And marveling as always at this strange symbiosis that humanity had found.

They were called flapblacks. Not a very imaginative name, and one which subsequent study had shown to be inaccurate anyway, but it had stuck now for five decades and there was no reason to assume it would ever get changed to something better. The first crew to run into one of the things had overscrubbed their meager sensor data until the creature had looked like a giant pancake shape wrapping itself around their ship and blocking off the starlight.

At which point, to their stunned amazement, it had picked up their ship and moved it.

As far as I knew, we still didn't have the faintest idea how the flapblacks did what they did. The idea that an essentially insubstantial being that apparently lived its entire life in deep space could physically carry multiple tons of star transport across multiple light-years at rates of up to five light-years per hour, was utterly absurd. We

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didn't know what they were made of, how they lived, what they ate, what else they did, how they reproduced, or how many of them per cubic light-year there were. In fact, when you boiled it down, there was virtually only one thing we *did* know about them.

And that was that they loved music. All kinds of music: modern, classical, folk melodies, Gregorian chants—you name it, some flapblack out there loved it. Play a clean musical tone through your hull and within seconds you'd have flapblacks crowding around like seagulls at a fish market. Start the music itself, and one of them would instantly wrap itself around the transport, and you'd be off for the stars.

"Spectrum's coming up," Bilko reported. "Yep—definitely a Blue."

I nodded again in acknowledgment. The flapblacks themselves showed little internal structure, and of course no actual color at all. But it hadn't taken long for someone to notice that, just as the transport was being wrapped, the incoming starlight experienced a brief moment of interference. Subsequent study had shown that the interference pattern looked and behaved like an absorption spectrum, with the lines from any given flapblack grouped together in a particular color of the spectrum.

That had been the key that had turned the original musical-shotgun approach into something more scientific. Flapblacks whose lines were in the red part of the spectrum were fairly slow, were apparently not strong enough to wrap transports above a certain mass, and came when you played musicals or opera. Orange flapblacks were faster and stronger and liked modern music—any kind—and Gregorian chants. I'd yet to figure that one out. Yellows were faster and stronger yet and liked jazz and classical rock/roll. Greens were still stronger, but now a little slower, and liked Baroque and Mozartian classical. Blues were the strongest of all, though slower than any of the others except Reds, and liked 19th-century romantic and any kind of folk melody.

It was the flapblacks and their love of our music that had finally freed humanity from Sol and allowed us to stretch out to the stars. More personally, of course, space travel was what provided me with my job, for which I was mostly grateful.

The catch was that it wasn't just the music they needed. Or rather, it wasn't the music alone. Which was, unfortunately, where musicmasters like Jimmy came in.

You see, you couldn't just play the music straight for them. That would have been too easy. What you had to have was someone aboard the transport listening to the music as you pumped it out through the hull.

And not just listening; I mean *listening*. He had to sit there doing nothing the whole time, following every note and rest and crescendo, letting his emotions swell and ebb with the flow. Basically, just really getting into the music.

The experts called it *psycho-stereo*, which like most fancy words was probably created to cover up the fact that they didn't know any more about

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this than they did anything else about the flapblacks. Best guess—heavy emphasis on *guess*—was that what the flapblacks actually liked was getting the music straight while at the same time hearing it filtered through a human mind. They almost certainly were getting the pre-music call telepathically—until they wrapped, there was no other way for them to pick up the sound in the vacuum of space.

However it worked, the bottom line was that I couldn't handle the job. Neither could Bilko or Rhonda. Sure, we all liked music, but we also all had other duties and responsibilities to attend to during the flight. Even if we hadn't, I doubt any of us had the kind of single-track mind that would let us do something that rigid for hours at a time. And you *had* to keep it up—one slip and your flapblack would be long gone and you'd have to stop and pull in another one.

That wasn't a problem in itself, of course; there were always flapblacks hanging around waiting to be entertained. The problem came in not knowing to the microsecond exactly how long you'd been traveling. At flapblack speeds, a second's worth of error translated into a lot of undershoot or overshoot on your target planet.

And even apart from all that, I personally still wouldn't have wanted the job. I've always considered my emotions to be my own business, and the thought of letting some alien will-o'-the-wisp listen in was right next to chewing sand on my list of things I didn't like to think about.

Enter Jimmy and the rest of the musicmaster corps. *They* were the ones who actually made star travel possible. People like Bilko, Rhonda, and me were just here to keep them alive along the way, and to handle the paperwork at the end of the trip.

It was a train of thought I'd been running along quite a lot lately, more or less beginning with our previous musicmaster's departure two months ago and Jimmy's arrival. My digestion was definitely the worse for it.

"Looks like everything's smooth here," Bilko commented, pulling his lucky deck of cards from his shirt pocket. "Quick game?"

"No, thanks," I said, looking at the cards with distaste. Considering that it purported to be a lucky deck, those cards had gotten Bilko into more trouble over the years. I'd lost track of how many times I'd had to pacify some pickup game partner who refused to believe that Bilko's winnings were due solely to skill.

"OK," he said equably, fanning the deck. "Want to draw cards for first turn in the dayroom, then?"

Mentally, I shook my head. For all his angling, Bilko could be so transparent sometimes. "No, you go ahead," I told him, keying in the autosystem and giving the status lights a final check. The dayroom, situated across the main corridor from the passenger cabin, was our off-duty spot. On the bigger long-range transports dayroom facilities were pretty extensive; all ours offered was stale snacks, marginal holotape entertainment, and legroom.

"OK," he said, unstrapping. "I'll be back in an hour."

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"Just be sure you spend that hour in the dayroom," I added. "Not poking around Scholar Kulasawa's luggage."

His face fell, just a bit. Just enough to show me I'd hit the target dead center. "What makes you think—?"

The intercom beeped. "Captain Smith?" a female voice asked.

I grimaced, tapping the key. "This is Smith, Scholar Kulasawa," I said.

"I'd like to see you," she said. "At your earliest convenience, of course."

A nice, polite, upper-class phrase. Completely meaningless here, of course; what she meant was *now*. "Certainly," I said. "I'll be right there."

I keyed off the intercom and looked at Bilko. "You see?" I told him. "She read your mind. The upper classes can do that."

"I wouldn't put it past them," he grumbled, strapping himself back down. "I hope your bowing and cringing is up to par."

"I guess I'll find out," I said, getting up. "If I'm not back in twenty minutes, dream up a crisis or something, will you?"

"I thought you said she could read minds.

"I'll risk it."

Scholar Kulasawa was waiting when I arrived in our nine-person passenger cabin, sitting in the center seat in a stiff posture that reminded me somehow of old portraits of European royalty. "Thank you for being so prompt, Captain," she said as I stepped inside. "Please sit down."

"Thank you," I said automatically, as if being allowed to sit in my own transport was something I needed her permission to do. Swiveling one of the other seats around to face her, I sat down. "What can I do for you?"

"How much is your current cargo worth?" she asked.

I blinked. "What?"

"You heard me," she said. "I want to know the full value of your cargo. And add in all the shipping fees and any nondelivery penalties."

What I should have done—what my first impulse was to do—was find a properly respectful way to say it was none of her business and get back to the flight deck. But the sheer unexpectedness of the question froze me to my seat. "Can you tell me why that information should be any of your business?" I asked instead.

"I want to buy out this trip," she said calmly. "I'll pay all associated costs, including penalties, add in your standard fee for the side trip I want to make, and throw in a little something extra as a bonus."

I shook my head. "I'm sorry to disappoint you, Scholar, "I said, "but this run is already spoken for. If you want to charter a special trip at Parex, I'm sure you'll be able to find a transport willing to take you."

She favored me with a smile that didn't have a single calorie of warmth anywhere in it. "Meaning you wouldn't take me?"

"Meaning if you wish to discuss it after we've offloaded at Parex I'll be willing to listen," I said, standing up. I had it now: her scholarhood was in psychology, and this was all part of some stupid study on bribery and ethics. "But thank you for the offer—"

"I'll pay you three hundred thousand neumarks," she said, the smile

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gone now. "Cash."

I stared at her. The power lifters and gourmet food we were carrying were worth maybe two hundred thousand, max, with everything else adding no more than another thirty. Which left the little bonus she'd mentioned at somewhere around seventy thousand neumarks.

Seventy thousand neumarks . . .

"You don't think I'm serious," she went on into my sudden silence, reaching into her jacket and pulling out what looked like a pre-paid money card. "Go on," she invited, holding it out toward me. "Check it."

Carefully, suspiciously, I reached out and took the card. Pulling out my reader, I slid it in.

As the owner of a transport plying some of the admittedly less-than-plum lanes, I had long ago decided that buying cut-rate document software would ultimately cost me more than it would save. Consequently, I'd made sure that the *Sergei Rock*'s legal and financial authenticators were the best that money could buy.

Scholar Kulasawa's money card was completely legitimate. And it did indeed have three hundred thousand neumarks on it.

"You must be crazy to carry this around," I told her, pulling the card out of my reader as if it was made of thousand-year-old crystal. "Where in the worlds did you get this kind of money, anyway?"

"From my university, of course. No—keep it," she added, waving the card back as I held it out to her. "I prefer payment in advance."

With a sigh, I stood up and set the card down on the seat next to her. Seventy thousand neumarks . . . "I already told you this trip's been contracted for," I said. "Talk to me when we reach Parex." I turned to go—

"Wait."

I turned back. For a moment she studied my face, with something that might have been grudging admiration in her expression. "I misjudged you," she said. "My apologies. Allow me to try a different approach."

I shook my head. "I already said—"

"Would you accept my offer," she cut me off, "if it would also mean helping people desperately in need of our assistance?"

I shook my head. "The Patrol's got an office on Parex," I said. "You want help, talk to them."

"I can't." Her carefully jeweled lip twisted, just slightly. "For one thing, they have no one equipped to deal with the situation. For another, if I called them in they'd take it over and shut me out completely."

"Shut you out of what?"

"The credit, of course," she said, her lip twisting again. "That's what drives the academic world, Captain: the politely savage competition for credit and glory and peer recognition." She eyed me again. "It would be so much easier if you would trust me. Safer, too, from my point of view. If this should get out . . ." She took a deep breath, still watching me, and let it out in a rush. "But if it's the only way to get your cooperation, then I suppose that's what I have to do. Tell me, have you ever heard of the *Freedom's Peace*?"

"Sounds vaguely familiar," I said,

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searching my memory. "Is it a star transport?"

She snorted gently. "You might say it was the ultimate star transport," she said dryly. "The *Freedom's Peace* was one of the five Giant Leap ark ships that headed out from the Jovian colonies 130 years ago."

"Oh—right," I said, feeling my face warming. Nothing like forgetting one of the biggest and most spectacular failures in the history of human exploration. The United Jovian Habitats, full of the arrogance of wealth and autonomy, had hollowed out five fair-sized asteroids, stocked them with colonists, pre-assembled ecosystems, and heavy-duty ion-capture fusion drives, and sent them blazing out of the solar system as humanity's gift to the stars.

The planetoids had stayed in contact with the home system for awhile, their transmissions growing steadily weaker as the distances increased and there was more and more interstellar dust for their transmission lasers to have to punch through. Eventually, they faded out, with the last of the five going silent barely six years after their departure. The telescopes had been able to follow them for another five years or so, but eventually their drives had faded into the general starscape background.

And then had come the War of Reclamation, ruthlessly bringing the Habitats back under Earth dominion and in the process wiping out virtually all records of the Giant Leap project. By the time humanity started riding flapblacks and were finally able to go out looking for them, they had completely vanished. "OK—the *Freedom's Peace*. What about it?"

"I've found it," she said simply.

I stared at her. "Where?"

"Out in space, of course," she said tartly. "You don't expect me to give you its exact location until you've agreed to take me there, do you?"

"But it's somewhere near Parex?" I prompted.

She eyed me closely. "It's accessible from Parex," she said. "That's all I'll say."

I pursed my lips, trying to think, listening with half an ear to the Brahms playing in the background. At least now I understood why there was so much money involved. Never mind the academic community; a historical find like this would rock the whole Expansion, from the Outer March colonies straight up to Earth and the Ten Families. Not to mention putting the discoverers permanently into the history books themselves.

Which did, however, bring up an entirely new question. "So why me?" I asked. "Your university could hire a much better transport than the *Serget Rock* with the money you're willing to spend."

Her thin lips compressed momentarily. "There are—competitors, shall we say—who want to reach the *Freedom's Peace* first. I know of at least one group that has been watching me."

"You're sure they don't know the location themselves?"

"I'm sure *this* group doesn't," she retorted. "But there are others, and some of them may be getting close." She waved a hand at the cabin around

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her. "I had to grab the first transport that was heading anywhere near it."

"But you *are* authorized to use that money card?" I asked.

She smiled coldly. "Trust me, Captain: if I succeed here, the university will gladly authorize ten times what's on that card. The historical significance of the furnishings alone will send shock waves through the Expansion. Let alone all the rest of it."

"All the rest of what?" I asked, frowning. I'd have thought the historical artifacts they would find aboard would be all there was.

"I thought I mentioned that," she said with a sort of malicious innocence. "When I asked about people needing assistance, remember? The *Freedom's Peace* isn't just drifting dead in space—it's still underway.

"Obviously, someone is still aboard."

The same rule book that said the musicmaster had to take a thirty-minute break every four hours also said that the crew was never to all be away from their posts at the same time, while in flight, except under extraordinary circumstances. I decided this qualified; and the minute Jimmy went on break, I hauled the three of them into the dayroom.

"I don't know," Bilko mused when I'd outlined Scholar Kulasawa's proposition. "The whole thing smells a little fishy."

"Which parts?" I asked.

"All parts," he said. "For one thing, I find it hard to believe this race is so tight she had to settle for a transport like the *Sergei Rock*."

"What's wrong with the *Sergei Rock*?" I demanded, trying not to take it personally and not entirely succeeding. "We may not be fancy, but we've got a good clean record."

"And don't forget those boxes of hers," Jimmy put in. I didn't have to ask how he was leaning—he was practically bouncing in his seat with excitement over the whole thing. "She needed a transport that could carry them."

"Yes—let's not forget those boxes," Bilko countered. "Did our esteemed scholar happen to tell you what was in them?"

"She said it was her research equipment," I told him.

"That's one hell of a lot of research equipment."

"Historians and archaeologists don't make do with a magnifying glass and tweezers anymore," I said stiffly.

"Why are we all arguing here?" Jimmy put in earnestly. "I mean, if there are people out there who are lost, we need to help them."

"I don't think Scholar Kulasawa cares two sparkles about whoever's aboard," Bilko growled. "It's Columbus Syndrome—she just wants the credit for discovering the New World."

"Shouldn't it be the Old World?" Jimmy suggested.

Bilko threw him a glare. "Fine. Whatever."

I looked at Rhonda. "You've been pretty quiet," I said. "What do you think?"

"I don't think it matters what I think," she said quietly. "You're the owner and captain, and you've al-

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ready made up your mind. Haven't you?"

"I suppose I have, really," I conceded. "But I don't want to steamroll the rest of you, either. If anyone has a solid reason why we should turn her down, I want to hear it."

"I'm with you," Jimmy piped up.

"Thank you," I said patiently. "But I was asking for dissenting opinions. Bilko?"

"Just the smell of it," he said sourly. "I might have something solid if you'd let me look into those crates of hers."

I grimaced. "Compromise," I said. "You can do a materials scan and sonic deep-probe if you want. Just bear in mind that Angorki customs would have done all that and more, and apparently passed everything through without a whisper. Other thoughts?"

I looked at Rhonda, then at Bilko, then back at Rhonda. Neither looked particularly happy, but neither said anything either. Probably had decided that arguing further would be a waste of breath. "All right, then," I said after a minute. "I'll go tell Scholar Kulasawa that we're in and get the coordinates from her. Bilko and I will figure out our vector and then you, Jimmy, will work out a program. Got it? Good. Everyone back to your posts."

Kulasawa accepted the news with the air of someone who would have found it astonishing if we *hadn't* fallen properly into line behind her. The location she gave me would have been a ten-hour trip from Parex, but as it happened was only about six hours from our current position. I couldn't tell whether she was genuinely pleased by that or simply considered it another example of the Universe's moral obligation to reconfigure itself in accordance to her plans and whims.

Regardless, the distance was reasonable and the course trivial to calculate. By the time Bilko and I had the vector worked out, Jimmy was ready with several alternative programs. I got him started on a four-hour program—he argued briefly for doing the entire six hours in one gulp, but I'd already stretched the rules enough for one trip—and had him get us underway.

And then, when everything was quiet again, I headed back to the engine room to see Rhonda.

Most of the engineer's job involved the lift and landing procedures, leaving little if anything for her to do while we were in deep space. Despite that, we almost never saw Rhonda in the dayroom. She preferred to stay at her post, watching her engines, listening to Jimmy's concert in solitude, and creating the little beadwork jewelry that was her hobby.

She was working on the latter as I came in. "Thought I'd check and see how you were doing back here," I greeted her as I stepped in through the hatchway.

"Everything's fine," she assured me, looking up from her beads.

"Good," I said, stepping behind her and peering over her shoulder. The piece was only half finished, but already it looked nice. "Interesting pattern," I told her. "Good color scheme, too. What's it going to be?"

"A decorated comb," she said. "It holds your hair in place in back." She

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twisted her head to look thoughtfully up at me. "For those of us who have enough hair to need holding, of course."

"Funny." I came around to the front of the board and pulled down a jumpseat. "I wanted to talk to you about this little side trip we're making. You really don't like it, do you?"

"No, I don't," she said. "I have no quarrel with locating the *Freedom's Peace* or even going there, though reneging on a contract is going to damage that clean record you mentioned in the dayroom."

"I know, but we'll make it right," I promised. "Kulasawa's given us more than enough money to cover that."

"I know," Rhonda said sourly. "And that's what's really bothering me: your motivation for all of this. Altruistic noises aside, are you sure it's not just the money?"

"If you'll recall, I turned down the money when she first offered it," I reminded her.

"But was it the money or the fact you didn't know anything about the job?" she countered.

"Some of both," I had to concede. "But now that we know what we're doing—"

"Do we?" she cut me off. "Do we really? Has Scholar Kulasawa thought through—I mean *really* thought through—what she intends to do once we get there? Is she going to volunteer the *Sergei Rock* passenger cabin to take them all back to Earth? Make grandiose promises of land on Brunswick or Camaraderie or somewhere that she has no authority to make?"

She waved a hand in the general direction of the passenger cabin. "Or maybe she doesn't intend to bring them home at all. She could be planning to leave them out there like some lost rain-forest culture for her academic friends to study. Or maybe she'll organize weekly tour groups for the public and sell tickets."

"Now you're being silly," I grumbled.

"Am I?" she countered. "Just because she's a scholar and has money doesn't mean she's got any brains, you know." She cocked her head slightly to the side. "Just how much above our expenses *is* she offering you?"

I shrugged as casually as I could. "Seventy thousand neumarks."

Her eyes widened. "Seventy *thousand?* And you *still* don't see anything wrong with this?"

"There's prestige involved here, Rhonda," I reminded her. "Prestige and academic glory. That's worth a lot more to any scholar than mere money. Remember, we know next to nothing about the Great Leap colonies—all that stuff went up in dust when the Ganymede domes were hit late in the war. We don't know what kind of astrogation system they had, how you create a stable ecosystem that compact, or even how you set about hollowing out eighteen kilometers' worth of asteroid in the first place. Scholars go nuts over that sort of thing."

"Yes, but three hundred thousand neumarks worth?"

I shrugged again. "It's the bottom line of being the ones who go down in history," I reminded her. "And re-

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member, the Tower's own records showed that we were the only transport headed for Parex for over a week. If her competitors have their own ship, then we're her only chance to get there first."

Rhonda shook her head. "I'm sorry, but I find that utterly incomprehensible."

"Frankly, so do I," I readily admitted. "That's probably why we're not scholars."

She smiled lopsidedly. "Besides being from the wrong end of the social spectrum?"

I shrugged. "Besides that. So I guess we'll just have to concentrate on the fact we're going to be helping to rescue some people who've been marooned in space for the past century and a third."

"And hope Kulasawa isn't planning to renege on her deal if we lose the race," Rhonda warned. "I don't suppose that topic happened to come up in conversation, did it?"

"As a matter of fact, it didn't," I said slowly, feeling my forehead wrinkling. "Maybe I'd better introduce it."

"You can do that when you ask about her cargo," Rhonda suggested helpfully. "Incidentally, assuming we get it, I trust you'll be spreading that seventy thousand bonus around equally?"

"Don't worry," I assured her, standing up and stepping to the hatchway. "What I've got in mind will benefit all of us."

"New engines, maybe?" she asked hopefully, her eyebrows lifting.

I gave her an enigmatic smile and left.

* * *

Bilko's materials scan on Kulasawa's crates was quick and not terribly informative. It revealed the presence of electronics components, some pretty hefty internal power supplies, magnetic materials, and some stretches of rather esoteric synthetic membranes. The sonic deep-probe was more interesting; from two directions on each of the crates the probe signals got bounced straight back as if from solid plates of conditioned ceramic.

Kulasawa's explanation, once I asked her, cleared up the confusion. The crates, she informed me, contained a set of industrial-quality sonic deep-probes. Though tradition said that each of the Great Leap Colonies had consisted mainly of a single large chamber hollowed out of the center of the asteroid, there was no solid evidence to back up that assumption; and if the *Freedom's Peace* proved instead to be a vast honeycomb of rooms and passages, it wouldn't be smart for us to start exploring it without first mapping out the entire network.

The first four-hour program ended, Jimmy chafed and groused his way through his regulation-stipulated break, and then we were off again. The transit time to the spot Bilko and I had calculated came out to be a shade over one hour forty-eight minutes, and Jimmy had worked up a program that nailed us there dead center on the nose.

The music stopped, the flapblack unwrapped itself, and Bilko and I gazed out the forward viewport.

At exactly nothing.

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"Where is it?" Kulasawa demanded, leaning over our shoulders to look. "You said we were here."

"We're where your data took us," I said, resisting the urge to lean away from her in the cramped space. Her breath was unpleasantly warm on my cheek, and her lip perfume had clearly been applied with a larger room in mind. "We're running a check now, but—"

"My data was accurate," she snapped. From the suddenly increased heat on my cheek, I guessed she had turned a glare my direction. Fortunately, I was too busy with my board to turn and look. "If we're in the wrong place, you're the ones to blame."

"We're working on it, Scholar," Bilko soothed in the same tone of voice I'd heard him use on card partners suddenly suspicious by how deep in the hole they'd gotten themselves. "In any astrogate calculation there's a certain margin of error—"

"I don't want excuses," Kulasawa cut him off, the temperature of her voice dropping into the single digits. "I want results."

"We understand," Bilko said, unfazed. "But those results may take time." He threw her a sideways glance. "And we do need room to work."

Kulasawa was still radiating frustration, but fortunately common sense prevailed. "I'll be in the passenger cabin," she said between clenched teeth, and stalked out.

The flight deck door slid shut behind her, and Bilko and I looked across at each other. "The lady's deadly serious about this, isn't she?" Bilko commented. "I'll bet you could bargain us up a little on the deal."

"I'd say she's at least two stages past deadly," I countered. "And I think trying to shake her down for more money would be an extremely poor idea right now. Rhonda, are you listening?"

"I'm right here," Rhonda's voice came over the intercom. "I presume you've both figured out the problem, too?"

"I think so," Bilko said.

"It's obvious in hindsight," I agreed. "Her location was based on raw observational data from Zhavoronok and Meena, both of which are ten light-years away from here."

"Right," Bilko added. "Obviously, she fed us the location directly without realizing that she was looking at where the colony was ten years ago."

"You got it," I said. "Hard to believe a scholar would make such a simple error, though."

"Unless she didn't realize they were still moving," Rhonda offered.

"No, she told me they were still underway," I said. "That's how she knew there was still someone aboard, remember?"

"She's a historian," Bilko said, waving a hand in dismissal. "Or maybe an archaeologist. Probably doesn't even know what a light-year is—you know how rampant upper-class specialization is."

"And someday all of us in the tech classes will take over," Rhonda echoed the populist slogan. "Dream on. OK, we know the problem. What's the solution?"

"Seems straightforward enough,"

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Bilko said. "We know they were headed away from Sol system, so we figure out how much farther they could have gone in ten years and go that far along that vector."

"And how do we figure out what speed they were making?" I asked him.

"From the redshift in their drive spectrum, of course," he said. "Assuming, of course, that Kulasawa was smart enough to bring some of the actual telescopic photos with her." He smiled at me. "You can be the one to go ask for them."

I grimaced. "Thanks. Heaps."

"Don't go into grovel mode quite yet," Rhonda warned. "Even if she has photos they won't do us any good, because we don't know what the at-rest spectrum for their drive was."

"Why not?" Bilko asked, frowning at the intercom speaker. "I thought it was just a standard ion-capture drive."

"There was nothing standard about it," Rhonda told him. "You can't just scale up an ion-capture drive that way—the magnetic field instabilities will tear it apart. Even now our biggest long-range freighters are running right up to the wire. God only knows what trick the Jovians pulled to make theirs work."

"If you say so," Bilko said. "Engines aren't really my field of expertise."

"Of course." I cocked an eyebrow at him. "What was that again about rampant specialization?"

He smiled lopsidedly. "Touché," he said. "So let's hear *your* idea."

I gazed out the viewport. "We start with a focused search along the vector from Sol system," I said slowly. "Even if we don't know what the spectrum looks like, we know they can't have gotten too far away from here yet. That means the drive glow will be reasonably bright, and our astrogator ought to be able to pick up on a major star that's not supposed to be there. Right?"

"Sorry," Rhonda said. "Astrogation's not my field of expertise."

"Give it a rest, Blankenship," Bilko growled. "Assuming it's still firing hot enough to look like a major star, yes, it'll work. Then what?"

"Then we head at right angles to that direction for a small but specified distance," I said. "Say, a few A.U. Then we come back out, find the drive trail again, and get the location by straight triangulation."

"Can we do a program that short?" Rhonda asked. "Even at Blue speeds an A.U. must go by pretty fast."

"A shade under six-hundredths of a second, actually," Bilko said. "And no, we can't do that directly."

"What we *can* do is run a few minutes out and almost the same number of minutes back," I added. "Some of the bigger freighters do that all the time to fine-tune their arrival position. Jimmy should have what he needs to work up that kind of program."

"We assume so, anyway," Bilko added. "But of course musicmastery isn't our field of expertise."

"Look, Bilko—"

"Play nicely, children," I said. "Bilko, get the sensors going, will you?"

The *Sergei Rock*'s sensors weren't quite up to the same ultra-high standard of quality as our legal and finan-

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cial software was. But they were certainly nothing to sneer at, either—the myriad of transport regulators that swarmed like locusts across the Expansion made sure of that. And so it came as something of a surprise when, thirty minutes later, the result of our search turned up negative.

"Great," Bilko said, tapping his fingers restlessly on the edge of his board. "Just great. *Now* what?"

"They must have turned off their drive," I said, looking over the astrogate computer's report again. "That, or else it's failed. Rhonda?"

"Seems odd that they would turn it off," Rhonda said doubtfully. "Certainly not in the middle of nowhere like this. And for it to have run 130 years and just happened to fail now would be pretty ironic."

"Yeah, but about par for the way my luck's been going," Bilko said sourly. "That last game I had on Angorki—"

"The Universe does not have it in for you personally, Bilko," Rhonda interrupted him. "Much as you'd like to think so. Jake, I'd guess it's more likely they simply changed course. If they shifted their vector even a few degrees their drive wouldn't be pointed directly at us anymore."

Abruptly, Bilko snapped his fingers. "No," he said, turning a tight grin on me. "They didn't change course. Not from *here*."

"Of course not," I said as it hit me as well. "All we need is to reprogram the searcher—"

"I'm on it," Bilko said, hands already skating across the computer board.

"Any time you two want to let me in on this, go ahead," Rhonda invited.

"We've assumed they hit this point on the way from Sol," I explained, watching over Bilko's shoulder. "But maybe they didn't. Maybe they headed out on a slightly different vector, paused to take a look at some promising system along the way, then changed course and headed out again."

"Passing through this point on an entirely different vector than the direct line from Sol," Bilko added. "OK, here it comes . . . computer says the only real possibility is Lalande 21185. That would put the vector . . . right. OK, let's try that focused search again. And keep your fingers crossed."

We didn't have to keep them crossed for very long. Three minutes later, the computer had found it.

"No doubt about it," Bilko decided. "We are definitely genius-class material."

"Don't start making laurel-leaf soup too fast," Rhonda warned. "Now, I take it, comes the tricky part?"

"You take it correctly," I said, unstrapping. "I'll go tell Kulasawa we've found her floating museum. And then go have a chat with Jimmy."

Kulasawa was elated in a grim, upper-class sort of way, managing to simultaneously imply that I should keep her better informed and that I also shouldn't waste time with useless mid-course reports. I escaped to Jimmy's cabin, wondering if maybe Bilko's suggestion of upping our price would really be unethical after all.

As Rhonda had suggested, the

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tricky part now began. Two successive performances of Schubert's "Erlkünig," the versions differing by exactly point five seven second gave us our triangulation point. Another reading on the *Freedom's Peace*'s drive glow, and we had them nailed at just over fifty A.U. away.

"Not exactly hauling Yellows, are they?" Bilko commented. "I mean, fifty A.U.s in ten years?"

"The engines were probably scaled for low but constant acceleration," Rhonda said. "They would have lost a lot of their velocity when they stopped to check out the Lalande system."

"Just as well for us they did," I pointed out. "If they'd been pulling a straight acceleration for the past 130 years we wouldn't have a hope in hell of matching speeds with them."

"Good point," Rhonda agreed. "Any idea what speed they *are* making?"

"As a matter of fact, I do," I said smugly, keying for the calculation I'd requested. "I took a spectrum of their drive at both our triangulation points. Because we were seeing the red-shifted light from two different angles—well, I won't bore you with the math. Suffice it to say the *Freedom's Peace* is smoking along at just under thirty kilometers a second."

"About three times Earth escape velocity," Bilko murmured. "Can the engines handle that, Rhonda?"

"No problem," she assured him. "We'll probably pop a few preburn sparkles, though. So what's the plan?"

"We'll set up a program that'll put us just a little ways ahead of them," I told her. "That way, we'll get to watch them go past us and can get exact numbers on their speed and vector."

"Provided they don't run us down," Rhonda murmured.

"They're hardly going fast enough for that," Bilko scoffed. "Fifty A.U.s means another forward-back program, of course."

"Right," I said, nodding. "You work out the course while I go help Jimmy set it up."

"Right," he said, turning to his board. "You going to give our scholar the good news on the way to Jimmy's?"

"Let's let it be a surprise."

Fifteen minutes later we were ready to go. "OK, Jimmy, this is it," I called toward the intercom. "Let's do it."

"OK," he said. "Here goes Operation Reverse Columbus."

I flicked off the intercom. "Operation Reverse Columbus?" Bilko asked, cocking an eyebrow.

I shook my head as the pre-music C-sharp vibrated through the hull. "He thinks he's being cute," I said. "Just ignore him." The pre-tone ended, and as the strains of Schumann's Manfred Overture began the stars vanished, and I settled in for the short ride ahead.

A ride which turned out to be a lot shorter than I'd expected. Barely two notes into the piece, with the music still going, the stars abruptly reappeared.

"Jimmy!" I snarled his name like a curse as I grabbed for my restraints. Of all times to break his concentration and lose our flapblack—

And then my eyes flicked to the viewport . . . and my hands froze on the release.

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Flashing past from just beneath us, no more than twenty kilometers away, was the *Freedom's Peace*.

And it was definitely cooking along. Even as I caught my breath it shot away from us toward the stars, its circle of six drive nozzles blazing furiously from the stern and dimming with distance—

And then, without warning, it suddenly flared into a brilliant blaze of light.

My first, horrified thought was that the colony had exploded right in front of us. My second, confused thought was that an explosion normally didn't have six neatly arranged nexus points . . . and as the six blazing circles receded in the direction the *Freedom's Peace*'s had been going, I finally realized what had happened. Not the how or the why, but at least the what.

On that, at least, I was ahead of Bilko. "What the hell?" he gasped.

"The music's still going," I snapped, belatedly hitting my restraint release and scrambling to my feet. "As soon as it got far enough ahead of us, we got wrapped again and caught up with it."

"We *what?* But—?"

"But why are we unwrapping when we get close?" I ducked my head and peered out the viewport, just in time to see us do our strange little microjump and catch up with the asteroid again. "Good question. Let me get Jimmy to shut down and we'll try to figure it out."

I sprinted back to his cabin, cursing the unknown bureaucrat or planning commission hotshot who'd come up with the idea of locking out the musicmaster's intercom whenever the music was playing. If these insane little wrap/unwraps were damaging my transport—

I reached the cabin and threw myself inside. Leaning back on his couch with his eyes closed and the massive headphones engulfing his head, Jimmy probably never realized anything was wrong until I slapped the cutoff switch.

At which point his reaction more than made up for it. He jolted upright like someone had applied electrodes to selected parts of his body, his eyes snapping wide open. "What—?" he gasped, ripping off his headphones.

"We've got trouble," I told him briefly, jabbing the intercom switch. "Rhonda?"

"Here," she said. "Why have we stopped?"

"It wasn't our idea," I said. "We lost our flapblack."

"About six times in a row," Bilko put in tensely from the flight deck. "As soon as we get close enough to the *Freedom's Peace*, we lose them."

"What's going on?" a voice demanded from behind me.

I turned around. Kulasawa was standing in the open doorway, her gaze hard on me. "You heard everything we know so far," I told her. "We've lost our flapblack wrap six times now trying to get close to the *Freedom's Peace*."

Her gaze shifted to Jimmy, hardening to the consistency of reinforced concrete. "It wasn't me," he protested quickly. "I didn't do anything."

"You're the musicmaster, aren't you?" she demanded.

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"It's not Jimmy's fault," I put in. "It's something having to do with the *Freedom's Peace* itself."

The glare turned back to me. "Such as?"

"Maybe it's the mass," Jimmy spoke up, apparently still too young and inexperienced to know when to keep his mouth shut and pretend to be furniture. "That's why flapblacks can't get too close in to planets—"

"This is an asteroid, musicmaster," Kulasawa cut him off icily. "Not a planet."

"Yes, but—"

"It's not the mass," Kulasawa said, dismissing the suggestion with a curl of her lip. "What else?"

"It could be their drive," Rhonda suggested over the intercom. "Maybe the radiation from an ion-capture drive that big is scaring them away."

"Or else killing them," Bilko said quietly.

It was a strange, even eerie thought, but one which I think had already occurred to all of us. We knew nothing about how flapblacks lived or died, or even whether they died at all. What we *did* know is that we traveled with them, and the thought that we might have been even indirectly responsible for killing a half dozen of them was an unpleasant one for all of us.

Or at least, most of us. "Regardless of the reason, we know the result," Kulasawa said briskly. "How do we proceed, Captain?"

"Actually, the situation isn't much different from what we were expecting anyway," I said, trying to push the image of dying flapblacks from my mind. "Except that it's going to be easier than we thought to get close to the *Freedom's Peace*. We should have gotten a good reading on their vector while we were tailgating them that way, so all we have to do now is boost our speed to match them and then get a flapblack to wrap us and get us close again."

"Even if it means killing another one of them?" Jimmy asked.

"What if it does?" Kulasawa said impatiently. "The Universe is full of the things."

"Besides which, we don't *know* it's hurting them," I added.

And immediately wished I hadn't. The expression on Jimmy's face was already somewhere between stricken and loathing; the look he now shot toward me was the sort you might give someone who'd just announced he enjoyed ripping the heads off small birds.

"Then let's get to it," Kulasawa said into the suddenly awkward silence. "We've wasted enough time out here already. You in the engine room: how long to bring us up to speed?"

"Depends on how much acceleration you want to put up with," Rhonda said, her tone a little chilly. Apparently, she wasn't happy with my comment, either. "At one *g*, we're talking an hour or so."

"You ran two *gs* lifting off Angorki," Kulasawa said.

"That was for ten minutes," I reminded her. "Not thirty."

"You're all young and healthy," she countered. "If I can handle it, so can you. Two *gs*, Captain. Get us moving."

It took Rhonda ten minutes to

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bring the engines up from standby, roughly the same amount of time it took Bilko and me to double-check the *Freedom's Peace*'s vector and make sure the *Sergei Rock* was configured for high acceleration. After that came our half hour of two *gs*, unpleasant but certainly nothing any of us couldn't take.

More unpleasant was the subtle but definite chill I could feel all around me. Orders were scrupulously obeyed and reports properly given, but all of it in crisp, formal tones and without the casual give-and-take that was the normal order of the day. I was used to frosty air between Jimmy and me, but for Rhonda and Bilko to have joined in struck me as totally unfair.

And yes, I blamed all of them. Maybe my comment had sounded insensitive; but damn it all, we *didn't* have any evidence that were killing or even hurting the flapblacks by pushing them close to the *Freedom's Peace*. My personal theory was that there was something about the asteroid that was simply distracting them enough to lose their wrap, and I tried to tell the others that.

But it didn't seem to make any difference. In their minds, I'd sold out to Kulasawa, and I'd now shown that nothing was going to keep me from getting hold of that money. Not even if it meant slaughtering flapblacks right and left.

The acceleration process seemed to take forever, but at last we had the *Sergei Rock* up to speed and it was time to go.

Theoretically, we didn't need to use the flapblacks at all, since the *Freedom's Peace* was close enough that boosting our speed a little more would enable us to catch up with it. But that would have meant more acceleration, more delay, and pushing the engines more than we already had, so I told Jimmy to set us up with another program. He wasn't at all happy about it, but I was long past caring about Jimmy's happiness. If Bilko and Rhonda had opinions on the subject, they were smart enough to keep quiet about them.

The music started, sparking a wrap/unwrap that was again too fast for human eyes to see, and once again we were flying above and behind the *Freedom's Peace*.

Even twenty kilometers away and only glimpsed for an instant, the colony had looked impressive. Now, with us steadily approaching it, the thing was flat-out awesome. It was one thing to read the numbers; it was something else entirely to actually *see* a huge asteroid driving its way through deep space.

It looked just like the handful of publicity shots that had survived the War of Reclamation: a craggy-surfaced, vaguely ovoid asteroid, roughly eighteen kilometers long and maybe twelve across at its widest point, lit only by the faint sheen of reflected starlight. The glare from the drive washed out any details of the engines themselves, but it was obvious that they were massive. Slightly brighter spots here and there across the surface indicated the presence of antenna or sensor arrays and a couple of rectangles that looked like access hatchways.

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"It's rotating," Bilko breathed from beside me. Apparently, he was so dazzled by the view that he'd forgotten we weren't on speaking terms. "Look—you can see that drive nozzle array turning around."

"Using rotation to create artificial gravity," I agreed. "They didn't have false-grav back then."

"I'm going to take a spectrum off the hull," he decided, keying his board and swiveling around his viewer. "A Doppler will give us better numbers on the rotation than—yow!"

I jerked against my restraints. "What?" I snapped.

"Something just flicked across the stars," he said tightly, punching keys on the spectrometer.

"Relax," Rhonda's voice came over the intercom. "It was probably a flapblack."

"Yeah, but it didn't wrap," Bilko said. "I've never heard of a flapblack coming in but not wrapping."

"Maybe they can't wrap this close to the *Freedom's Peace*," I said. "Like I suggested earlier—"

I broke off at the look on Bilko's face. "What is it?"

"It reads like a flapblack, all right," he said, his voice low and rigidly under control. "Only it's not a kind we've ever seen before. This one's spectrum was in the infrared."

I stared at him. "You're joking."

"Check it yourself," he said, keying the analysis over to my display. "The spectrum's definitely below the standard flapblack red—let's call it an InRed."

I looked at the numbers, and damned if he wasn't right. "OK," I said. "So we've found a new breed. So we get into the history books."

"You're missing the point," he said grimly. "We have a new breed of flapblacks, all right: a breed *that chases other flapblacks away*."

There was a soft whistle from the intercom. "I don't like the sound of that," Rhonda said.

"Me, neither," Bilko said. "Maybe we ought to forget the whole thing and get out of here."

I gazed out the viewport at the rapidly approaching asteroid below. "But it doesn't make sense," I told them. "For starters, if it's a predator or whatever—"

"If *they're* predators, plural," Bilko interrupted me. "Another InRed just went past."

"Fine; if *they're* predators," I amended, "then why haven't we seen them before? More to the point, what are they doing hanging around the *Freedom's Peace* in the middle of nowhere?"

If Bilko had an answer, he never got to give it. Without warning, there was the faint flicker of a laser from the asteroid and our comm speaker crackled. "Approaching transport, this is the *Freedom's Peace*," a female voice said. "Please identify yourself."

Bilko and I exchanged startled glances. Then I dove for the comm switch. "This, uh, is Captain Jake Smith of the star transport *Serget Rock*. We, uh . . . who is this?"

"My name is Suzenne Enderly," the woman said. "Are you in need of assistance?"

"We were just about to ask you that question," Kulasawa said, stepping

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through the hatchway behind me onto the flight deck. "This is Scholar Andrula Kulasawa, in charge of this mission."

"And what mission would that be?"

"The mission to see you, of course," Kulasawa said. "We would like permission to come aboard."

"We appreciate your concern," Enderly said. "But I can assure you that we're doing fine and have no need of assistance."

"I'm very glad to hear that," Kulasawa said. "But I would still like to come aboard."

"To study us, I presume?"

I looked up at Kulasawa in time to catch her cold smile. "And to allow you to study us, as well," she said. "I'm sure each of us can learn a great deal from the other."

There was a brief silence. "Perhaps," Enderly said. "Very well."

And on the dark mass below a grid of running lights suddenly appeared. "Follow the lights to the colony's bow," Enderly continued. "There's a docking bay there. We'll use our comm lasers to guide you in."

"Thank you," I said. "We'll look forward to meeting you."

The laser winked out, and I keyed off the comm. "Well?" I asked Kulasawa.

"Well, what?" she countered. "You have your docking instructions. Follow them."

I had envisioned some kind of makeshift docking umbilical stuck perhaps to one of the hatchways we'd spotted on our approach. To my relieved surprise, the docking bay proved to be a real bay: a wide cylindrical opening leading back into the asteroid proper, fully equipped with guide lights and beacons. And, at the far end, a set of ancient but functional-looking capture claws that smoothly caught the *Sergei Rock* and eased it into one of the half dozen slots set around the inside of the open space.

"What now?" Kulasawa asked as we touched gently onto the bare rock floor and the overhead panel slid closed.

"We wait," I said, switching off the false-grav and fighting against the momentary disorientation as the asteroid's rotational pseudogravity took over.

"Wait for what?" Kulasawa demanded. This close to the asteroid's axis the pseudogravity was pretty small, but if she was suffering from free-fall sickness she was hiding it well.

"For them," Bilko told her, pointing out the viewport.

From a door in the far wall three people wearing milky-white isolation suits and gripping carrybag-sized metal cases had appeared and were making their slightly bouncing way toward us. "Offhand," he added, "I'd say it's a medical team."

He was right. We opened the hatchway at their knock, and after some stiffly formal introductions we spent the next hour having our bodies and the transport itself run through the microbiological soup-strainer. Their borderline paranoia was hardly unreasonable; with 130 years of bacteriological divergence to contend with, something as harmless to us as a flu virus could rage through the colony like the Black Death through Europe.

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In fact, it was something of a mild surprise to me when, after all the data had been collected and analyzed, we were pronounced safe to enter. The team gave each of us a broad-spectrum immunization shot to hopefully protect us from their own assortment of diseases, and a few minutes later we were all finally riding down an elevator toward the colony proper.

The ride was longer than I'd expected it to be, and it wasn't until we were well into it that I realized the elevator had been made deliberately slow in order to minimize the slightly disconcerting mixture of increasing weight and Coriolis forces as we headed "down" toward the rim of the asteroid. Personally, I didn't have any trouble with it, but it appeared this was finally the combination that had gotten to Kulasawa's heretofore iron stomach. Her eyes gazed straight ahead as we descended, the expression on her face one of tight-lipped grimness. I watched her surreptitiously, trying not to enjoy it too much.

Considering the historic significance of our arrival, I would have expected a good-sized delegation to have been on hand. But apparently this wasn't a society that went in heavily for brass bands. Only three people were waiting for us as the elevator doors opened: two stolid-looking uniformed men, and a slender woman about Kulasawa's age standing between them.

"Welcome to the *Freedom's Peace*," the woman said, taking a step forward as we stepped out. "I'm Suzenne Enderly; call me Suzenne."

"Thank you," I said, glancing around. We were in a long room with an arched ceiling and no decoration to speak of. Set into the wall behind our hosts was a pair of heavy-looking doors. "I'm Captain Jake Smith," I continued, returning my attention to the woman. "This is my first officer, Will Hobson; my engineer, Rhonda Blankenship; my musicmaster, Jimmy Chamala. That one's a little hard to explain—"

"That's all right," the woman assured me, her eyes on Kulasawa. "And you must be Scholar Andrula Kulasawa."

"Yes, I am," Kulasawa said. "May I ask your title?"

Suzenne tilted her head slightly to the side. "What makes you think I have one?"

"I recognize the presence of authority," Kulasawa said. "Authority always implies a title."

Suzenne smiled. "Titles aren't nearly as important to us as they obviously are to you," she said. "But if you insist, I'm a Special Assistant to King Peter."

I felt a stir go through us over that one. The traditional concept of hereditary royalty had long since vanished from the Expansion's political scene, though it was often argued that that same role was now being more unofficially filled by the Ten Families. Still, the idea of a real, working king sounded strange and anachronistic.

For some of us, though, it apparently went beyond merely strange. "A king, you say," Kulasawa said, her voice heavy with disapproval.

Suzenne heard it, too. "You disapprove?"

For a moment the two women

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locked gazes, and I prayed silently that Kulasawa would have the sense not to launch into a political argument here and now. Suzenne's two guards looked more than capable of taking exception if they chose, and getting thrown into the dungeon or whatever they had here was not the way I had hoped to end what had become a long and tiring day.

Fortunately, she did. "I'm just a scholar," she told Suzenne, her voice going neutral again. "I observe and study. I don't pass judgment."

"Of course." Suzenne smiled around at the rest of us. "But I'm forgetting my manners, and I'm sure you're all anxious to see our world. This way, please."

She turned and walked back toward the door, the two guards stepping courteously aside to let our group pass and then closing ranks behind us. "Incidentally, the study team tells me you have several large crates aboard," Suzenne added over her shoulder. "May I ask what's in them?"

"Two of them contain my personal research equipment," Kulasawa said before I could answer. "The others contain food and some power lifters which we brought as gifts for you."

Out of the corner of my eye, I saw Rhonda start. "Gifts?" she echoed. "But that's our cargo."

"Which if you'll recall I purchased from you," Kulasawa said, throwing a sharp look at her. "They're mine to do with as I choose."

Rhonda turned to me. "Jake?"

"That *was* part of the deal," I reminded her.

"Yes, but—" She broke off, an oddly betrayed look on her face.

"You're most generous," Suzenne said, pulling out a plastic card and holding it up to a panel beside the doors. "But I'm afraid we can't accept gifts. One of our techs will evaluate the items and issue you credit slips." The doors slid open, and we stepped out onto a wide, railed balcony—

And I felt my mouth drop open. Stretching out before us, exactly as Enderly had said, was an entire world.

It was like looking at a giant diorama designed to show young schoolchildren all the various types of terrain and landscape one might come across. Far below us, extending for at least a few kilometers, was what seemed to be a mixture of farmland and forest, marked by gentle hills of various heights and dotted with occasional clusters of houses. Numerous ponds were scattered around, glistening in the sunlight, and there was at least one river wending its way across the ground. Farther away, I could see what looked like a small town, then more greenery—grassland or more farms, I couldn't tell which—then more trees and buildings and finally the tall spires of an actual city.

"Look at that," I heard Jimmy murmur. "The edges—they turn up."

I looked to the side. In the distance, I could indeed see the edges of the landscape rising up toward the sky.

And in that moment, at least for me, the illusion abruptly collapsed. I was no longer gazing out over some nice planetside rural area. I was inside an asteroid, billions of kilometers from anywhere, driving hard through the blackness of space.

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"I suppose it does take some getting used to," Suzenne said quietly from beside me. "I grew up with it, of course, so to me it seems perfectly natural."

"I guess it would," I said, following the curve upward with my eyes. It was mostly more of the same, though the pattern of farm and forest had been varied and there was what looked like a large lake visible part way up. I tried to follow the curve all the way up, but began to lose it in the glare of the sun.

The sun? "I see you have the ultimate light fixture," I commented, pointing. "I hope that's not a real fusion generator."

"It's not," Suzenne assured me. "We don't have any problem with generating heat inside the colony—it's dumping the excess we sometimes find troublesome, particularly during the winter season. No, our sun is just a very bright light source, running along inside a tunnel through the rotational axis. It fades in at this end of the chamber in the morning, crosses slowly to the other end throughout the day, and then is faded out to give us some twilight. Then it's sent back across during the night and prepped for the new day. It's not the same as living on a planet, I suppose, but it's the closest arrangement the designers could come up with and it's probably pretty accurate."

I squinted up at it. The light was bright enough, but not the blinding intensity of a real G-type sun. "Looks like it's getting toward evening."

"About another hour to sunset," she said. "And yes, we do call it sunset. I'm afraid that's not going to leave you much time to look around tonight."

"Don't worry about it," I assured her. "We're not very far off your schedule ourselves, and I for one could do with an early night."

"That will work best for us, too," she said. "I'll arrange for rooms for all of you, and you can look around and meet King Peter in the morning."

"Sounds good." I looked up again as another thought struck me. "You don't have any stars, of course."

"Not real ones," she said. "But the various city lights look a little like them from the opposite side. And there are observation rooms at the bow for anyone who wants to see the stars for real."

"The landscape looks pretty real, too," I commented. "But you seem to have forgotten about mountains."

She smiled. "Not really. You're standing on one. If you'll excuse me, I have to see to our transportation."

She walked away. Grimacing slightly, I crossed to the far edge of the balcony. Making sure I had a solid grip on the railing, I looked down.

And found myself gazing down the slope of a rocky cliff at a pasture a kilometer or more below.

"Do you believe this?" Bilko commented, coming up beside me and glancing casually down. "Mountain climbing the easy way—you can start at the top if you want to."

"You really think people climb this?" I asked, taking a long step back from the edge.

"Oh, sure," Bilko said. "Probably designed that way on purpose. In fact,

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if you look around, you can see different-grade slopes all around this end of the chamber. I'll bet they ice some of them up in the winter so that the really committed nutcases can ski, too."

I grunted. "They're welcome to it."

"Personally, I'd rather have a good game of skill myself." Leaning an elbow on the railing, he nodded casually off to the side. "Speaking of nutcases, did you happen to notice the crowd of cardsharps over there?"

Frowning, I turned to look. *Cardsharps* was the current cutesy slang term for *cops* among Bilko's gambling buddies; but all I could see over there was Suzenne and a half dozen men in coveralls maneuvering a compact multi-passenger helicopter out of a hangar carved out of the rock. Between us and them, the two uniformed men she'd had up above were standing their stolid guard. "Since when do two men constitute a crowd?" I asked.

"Oh, come on, Jake, use your eyes," Bilko chided. "Those aren't techs rolling out that helicopter. They're cops, every one of them."

I threw him a look, turned back to the techs. "Sorry, but I still don't see it."

"It's your innate honesty," Bilko said. "Take my word for it, they're cops."

"Fine," I said, stomach tightening briefly with old memories. "So they're a little nervous and want to keep an eye on us. So what? Don't forget, we're the first outside contact they've had in 130 years."

"I suppose," Bilko said reluctantly. "It's just that a mix of uniformed and non-uniformed always makes me nervous. Like they're trying to con us."

Suzenne turned and beckoned us toward her. "Which qualifies as working your side of the street, no doubt," I commented as Bilko and I headed across the balcony toward her.

"Hey, I play a clean game," he protested. "You know that."

"Sure," I said. "Just do me a favor and don't try to draw cards with the pilot until we've actually landed, all right?"

Rhonda and Jimmy, who'd been admiring the view from a different part of the balcony, reached the helicopter the same time we did. Kulasawa, who'd wandered off on her own, arrived maybe ten seconds behind us. "We're ready to go," Suzenne said. "Rooms are being prepared for you in the guest house across from the Royal Palace. It's not nearly as grand as the name might imply," she added, looking at Kulasawa. "As I said, titles really aren't that important here."

"Of course," Kulasawa said. "Should we have brought some food from the transport?"

"A meal will be awaiting you," Suzenne promised. "Nothing fancy, I'm afraid, but it should tide you over until the more formal welcoming dinner tomorrow."

"And my research equipment?"

"It will be brought to the guest house tonight," Suzenne said. "Along with the rest of the cargo." She looked around the group. "Are there any other questions before we go?"

"I have one," Jimmy said hesitantly, looking warily at the twin helicopter blades hanging over our heads.

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"You're sure it's safe to fly in here?"

"We do it all the time," Suzenne assured him with a smile. "Bear in mind that the chamber is over thirteen kilometers long and that it's five kilometers from the ground to the sun tunnel. There really is plenty of room."

"And now," she continued, looking around again, "if there are no other questions, please go ahead and find a seat inside. It's time for us to go."

The Royal Palace was indeed not nearly as fancy as its name had implied. Situated near the center of the city I'd seen from the balcony, it much more resembled an extra-nice government building than it did a medieval castle or even your basic presidential mansion.

But it had a helipad on the roof, and the guest house Suzenne had mentioned was right across the street, and for me that was what counted. What with the long flight and strain of finding and getting to the *Freedom's Peace*—plus the two short nights that had gone before—I discovered midway through the helicopter ride that I was unutterably tired.

The meal Suzenne had promised, consisting of a buffet of cold meats, cheeses, fish, bread, and fruit, had been laid out in the common area of the suite we'd been booked into. I wolfed down just enough to quiet the rumblings in my stomach and then went in search of my bed. My room was quiet and dark, the bed large and comfortably firm, and I was asleep almost before the blankets settled down around me.

* * *

I awoke to sunlight streaming in through a gap in the curtains and a smell of roast chicken in the air that reminded my stomach that the previous night's meal hadn't been much more than a gastronomic promissory note. Throwing on yesterday's clothes, I made a quick trip to the attached bathroom and headed out into the common area.

The remains of another buffet were on the sideboard where the evening meal had been laid out, with a short stack of used plates on a tray near the door. Over at the window, sitting across from each other at the long dining table, were Rhonda and Suzenne. A sampling of Rhonda's beadwork was spread out on the table between them.

"About time," Rhonda commented as I stepped into the room. "The rest of us have been up for a couple of hours now."

"I had more sleep to catch up on than the rest of you," I reminded her as I snagged a clean plate and started stacking it with food. "I was the one who spent most of the past two nights sitting up with sick paperwork, remember?"

"Sick paperwork?" Suzenne asked, frowning.

"We had some strange problems at the Angorki spaceport," Rhonda explained. "Lost or fouled-up permits and such. It took a couple of days to get it all straightened out."

"Just as well it did, I suppose," I commented, picking up a set of flatware and taking my breakfast over to the table. "If we hadn't been delayed, Scholar Kulasawa would have had to

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find some other transport." I gestured out the window. "And then we'd have missed seeing all this."

"Yes," Suzenne murmured, dropping her eyes to the beadwork.

I nodded toward the beads. "Working on a new customer, I see."

"I beg your pardon," Rhonda said, mock-annoyed. "I am not working a new customer; I'm participating in a cultural exchange."

"We don't have these here," Suzenne said, fingering one of the earrings. "I've never even seen anything like it, even in our archives."

"I'm sure it's there," Rhonda said. "It's a pretty ancient art form, but its popularity does rise and fall."

"Whatever its heritage, it's beautiful," Suzenne said. "I'm sure you'll be able to sell a lot of these pieces here if you want to. You could probably teach classes, too."

"I doubt we'll be here long enough for that," I warned. "Where's everybody else, by the way?"

"They're all outside looking around," Rhonda said. "Jimmy went to find where the music was coming from—"

"Music?" I echoed, frowning.

She nodded. "You can't hear it very well in here, but it's quite audible if you step outside. Beautiful, but very alien."

"We write most of our own music here," Suzenne said. "We play it as a service to—" Her lips compressed briefly. "Well, we can talk about that later."

"Bilko's out, too," Rhonda continued. "He said he was going to hunt down a card game."

I made a face. "Well, good luck to him," I said. "I'll bet the *Sergei Rock* to his lucky deck he won't find a game that'll take Expansion neumarks."

"No, we're still using the First Citizens' supply of Jovian dollars," Suzenne said. "But he took one of the credit slips with him, and he'll be able to exchange that for the coins."

I felt my jaw drop a few millimeters. "One of the credit slips for our cargo?" I demanded, looking at Rhonda. "And you *let* him?"

She returned my glare evenly. "It was his share of the money," she pointed out. "Besides, he usually makes a profit on these games of his."

"Usually antagonizing the local populace in the process," I pointed out darkly. "And this is one place you do *not* want to get run out of town."

"I'm sure he'll be fine," Suzenne soothed me. "And just for the record, we don't run troublemakers out of town. We have a proper prison, though it's fortunately not used very much."

"I see," I said, peering past her out the window. The room faced east, toward the end we'd come in from; and blamed if it *didn't* look like real mountains over there. "You know, this chamber looks pretty big, but if I remember the numbers you gave us there's still a lot of the asteroid unaccounted for. What do you do with the rest of it?"

"All around the main chamber, beneath our feet, is the bulk of our recycling equipment," Suzenne said. "Of course, that takes up only a fraction of the kilometer or so of stone between

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us and the outside, so there's still plenty of structural strength and radiation protection. At the aft end of the asteroid are the fusion generators and ion-capture engines, along with the hydrogen-scooping equipment to fuel them. The designers also left a fair amount of space completely untouched for our future needs. We've dug into some of that to get materials for new buildings and to replace the inevitable losses in the recycling system."

She smiled. "And since we had to dig anyway, we went ahead and fashioned the resulting holes into a series of caves. It provides a little recreation for our resident spelunkers."

"You think of everything, don't you?" I said, shaking my head in admiration. "I wish the leaders of the Expansion were this competent."

Suzenne shrugged. "We're flattered, of course, but you have to realize it's not a fair comparison. With a population still under half a million people, we're more like a small city than we are a nation, let alone an entire world. Government on this scale is nearly always more efficient."

"You haven't asked about Kulasawa," Rhonda spoke up.

I hadn't asked about Kulasawa because I frankly didn't care where she was. But there was something in Rhonda's expression . . . "OK, I'll bite," I said. "What about Kulasawa?"

Rhonda gestured to Suzenne. "Why don't you tell him?" she invited.

"It's not all that mysterious," Suzenne shrugged. "She was up early asking permission to set up her recorders around the colony, that's all."

I frowned. "Recorders?"

"Those large flat panels," Suzenne amplified. "They were stacked together inside two of the crates we brought over from your transport."

The equipment Kulasawa had told *me* was a set of sonic deep-probes. "Ah," I said. "And what did you tell her?"

"Actually, we thought it was a good idea," Suzenne said. "We have a lot of unified records from the first few years of the voyage, but nothing very organized after that. She agreed to give us copies we could edit into a true-time documentary, and so we let her go."

"They also lent her a driver and a couple of helpers," Rhonda put in. "She's been gone—how long?"

"Not quite three hours," Suzenne said, consulting her watch. "I'm hoping she'll be done before your meeting with King Peter."

"And when is that exactly?" I asked, suddenly aware of my grubby and unshowered state.

"I've set it up for two hours from now," Suzenne said. "Will that give you enough time to prepare?"

"Oh, sure," I said, digging an oddly shaped fork into a sculpted piece of melon. "I wonder if you could get my carrybag in from the *Sergei Rock*, though—this uniform is getting a little rank."

"Our luggage has already been delivered," Rhonda told me. That odd look, I noted uneasily, was still on her face. "They're in the closet over there."

"And I'd better get out of your way," Suzenne added, pushing her

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chair back and standing up. "If there's anything else you need, there's a phone on the table over there. Just punch the call button and give my name—Suzenne Enderly—and they'll connect us."

"Thank you," I said.

"I'll be back in a little under two hours to escort you to the Palace," she said, walking toward the door. "Until then, if you get ready early, feel free to look around the city. Just be sure to take the phone with you."

She left, closing the door behind her. "An audience with a real king," I commented, stuffing a bite of chicken in my mouth. "Something I've wanted to do since I was a kid. Too bad his name couldn't have been Arthur."

"Too bad," Rhonda agreed, her voice neutral, her expression gone from odd to flat-out accusing as she stared hard at me. "All right, Jake, let's hear it."

"Let's hear what?"

"The reason you didn't tell her that Kulasawa's gadgets aren't recorders," she said. "Or had you forgotten she told *us* they were sonic deep-probes?"

"Who says they're not recorders, too?" I asked. "They could be both probes *and* recorders."

"Or they could be something else entirely," she countered. "The point is that she's either lying to Suzenne or else she lied to us. And you didn't blow the whistle on her."

"Neither did you," I shot back. "If you're so worried about it, why didn't *you* say something?"

"Because I was waiting for your lead," she said. "And because I wanted to see just how strong a hold Kulasawa has on you."

I jabbed my fork viciously into my fruit cup, splattering a few drops of juice onto the plate. "She hasn't got any hold on me," I insisted.

"My mistake," Rhonda said. "It's not her, it's the seventy thousand neumarks."

I glared at her, my hand squeezing the fork hard, wanting to tell her it was none of her damn business.

But I couldn't. And she obviously could read that in my face. "This is me you're talking to, Jake," she said quietly. "We've been flying together for over three years now. If something's wrong, isn't it time you told me what it was?"

I closed my eyes, exhaling my anger with a chest-aching sigh. "I'm in something of an awkward situation," I said, the words feeling like ground glass in my mouth. "Five years ago . . . well, let's just say it: I stole some money from the TransShipMint Corporation."

Her eyes widened, just enough to make the admission hurt that much more. "*You?*" she asked disbelievingly.

"Yes, me," I growled. "Why, is that so hard to believe?"

"Frankly, yes," she said. "You're the one who's always so brass-butted about following the rules." She waved a hand as if to erase that. "Sorry—I didn't mean it that way."

"Yes, you did," I said. "I don't suppose it ever occurred to you that there might be a reason why I was always so strict? Like a metric ton of guilt, maybe?"

She grimaced. "I guess that never

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occurred to me," she conceded. "So what happened?"

I shrugged uncomfortably. "Like I said, I stole some money. Oh, I rationalized it—told myself I needed some new equipment for my transport, that if I invested it in this sure-fire deal I was being offered I could get what I wanted and still pay the company back out of my profits. But the bottom line is, I stole it."

"How much?"

"A lot," I told her. "Two hundred thousand neumarks."

Her eyes went even wider this time. "Oh, *Jake*."

"Oh Jake and a half," I agreed ruefully. "You can guess the rest: the sure-fire deal went sour and I lost the whole wad."

She winced. "What did they do to you?"

"Strangely enough, they didn't seem to notice the loss," I said. "Or maybe they did but couldn't figure out where it had gone. I thought maybe I'd gotten away with it, at least from a legal standpoint, though I knew I was going to have to pay them back."

"All two hundred thousand?"

"Every last pfennig," I said. "Why do you think you haven't gotten me to spring for new engines yet? Every half-neumark of profit I've made for the past five years has gone into a special account I've got stashed away on Earth. I figured I'd wait until the statute of limitations was up, just in case, and then send them the money along with an explanation and confession. Anonymous, of course."

"So what went wrong?"

I looked out the window at the distant pseudo-mountains. "About a month ago a TransShipMint agent contacted me," I said. "He said they'd figured it out, and were going to press charges unless I could pay back all the money by the end of the month."

"My God," she breathed. "What did you do?"

"Begged and pleaded another month out of them." I shook my head. "But everything else I've tried has come up dry."

Rhonda sighed softly. "And then Scholar Kulasawa showed up on our gangplank and offered you seventy thousand neumarks."

"I've got a hundred thirty already banked away," I said. "Kulasawa's seventy thousand would just cover it."

"Yes, it would." Rhonda paused. "You told me earlier you were going to use the money in a way that would benefit all of us. You were planning to sell the *Sergei Rock*, weren't you?"

"There was no other way," I said. "It would have cost all of you your jobs, but there was no other way. Until Kulasawa came along."

I looked back at Rhonda. "But if you're right, and she's pulling some kind of scam on the people here—"

"Wait a minute—I didn't say she was pulling any scams," she said quickly, holding up a hand.

"But you implied it."

"I implied she was stretching the truth," she insisted. "That's not the same."

I folded my arms across my chest. "Look, Rhonda, I appreciate your attempts to salve my conscience. But I'm not going to trade one load of

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guilt for another."

"And I'm not going to let you sacrifice your transport over my vague and unfounded suspicions," she countered. "Not to mention all our jobs."

"You and Bilko won't have any problem finding new jobs," I told her. "And Jimmy'll be snapped up so quick it'll make your head spin."

"Then let me put it another way," she said quietly. "I don't want to see the team broken up."

I forced a smile. "Got seventy thousand neumarks on you?"

Reaching across the table, she squeezed my hand reassuringly. "We'll figure something out," she said. "Thanks for telling me."

She stood up. "I'd better get to the shower and then practice my curtsies. I'll see you later." Collecting her carrybag from the closet, she returned to her room.

I turned back to my breakfast. On one level, it was something of a relief to have the dark secret out in the open at last, to have someone whose opinions I cared about still accept me despite it all.

But neither the soul-cleansing nor Rhonda's compassion in any way changed the basic situation. And the food, delicious barely five minutes ago, now tasted like sand.

The arched doorway facing us was far more impressive than the actual exterior of the Palace. And for a good reason: it was the entrance to King Peter's royal reception room, the place where he held public audiences and from which he did his broadcasts to the entire colony when such was deemed necessary.

All this came from Suzenne, who had also assured us that the two uniformed guards flanking the archway would momentarily be getting the word from inside that the king was ready. At which point they would pull open the heavy wooden doors and admit us.

Us consisting of Rhonda, Suzenne, and me.

"Stop fidgeting," Rhonda murmured in my ear.

"I am *not* fidgeting," I insisted, rubbing my fingertips restlessly against my leg and throwing baleful glances at the door we'd entered the anteroom though. Kulasawa was supposedly on her way; but Jimmy and Bilko had both disappeared somewhere into the city and no one knew where to find them. When this was all over, assuming King Peter didn't throw me in the dungeon for the impertinence of wasting his time with only half a crew, I was going to strangle both of them.

"Scholar Kulasawa's just coming into the Palace," Suzenne said softly, her phone to her ear. "Oh, and we've found Jimmy—he was with one of our musicians. They're bringing him straight over."

Which still left Bilko unaccounted for. Predictably. "Any chance Jimmy will actually be here before those doors open?"

"Probably not," Suzenne said, smiling as she consulted her watch. "But don't worry about it. This is just an informal introductory meeting—anything formal we decide to do will hap-

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pen this evening or tomorrow. He isn't going to be upset if you're not all here."

She drifted away, turning her back to us as she spoke quietly into the phone. "Then why are you trying so hard to find him?" I muttered under my breath. I turned to Rhonda to detail what I intended to do to Bilko when he finally surfaced—

And paused. Rhonda was staring at Suzenne's back, a suddenly tight look on her face. "Relax," I told her. "I'm the nervous one in this group, remember?"

"Something's wrong here, Jake," she said slowly, her voice barely audible. "Something having to do with Jimmy."

I felt my heart seize up. Jimmy was our musicmaster, a vital ingredient for getting the *Sergei Rock* back home. "You think he's in danger?"

"I don't know," she said, her eyes focused on infinity. "It's something that's been nagging at me ever since last night."

I looked over at the guards flanking the doorway. The way their uniforms were cut, I couldn't tell whether they were armed or not. "What time last night? After we got to the city?"

"No, before that," Rhonda said, her forehead creasing a little harder. "It was on the flight over here; but it started before that . . ."

Abruptly, she looked up at me. "It was when we first met Suzenne," she hissed. "When you introduced Jimmy as our musicmaster. *She never asked what a musicmaster was.*"

I played the whole scene back in my mind. Rhonda was right. "Could she have asked someone during the flight?"

"No," Rhonda said, shaking her head microscopically. "I was sitting next to her, remember? Jake, they didn't have musicmasters until fifty years ago."

"I know," I said, a sudden tightness in my stomach. "I think I even mentioned to Suzenne that it was hard to explain."

"So why didn't she ask about it?" Rhonda persisted. "Either she's not very curious . . . or else she already knew."

I looked over at Suzenne, still on the phone. "But that's impossible," I murmured. "If someone else had found the *Freedom's Peace*, we'd have heard about it."

Rhonda shivered. "Only," she said, "if they made it home again."

I swallowed hard. "That new species of flapblacks Bilko spotted hanging around the asteroid. The InReds."

"I was just wondering that," Rhonda murmured. "Suzenne and the others might not even realize the previous transport or transports hadn't made it back alive."

"Maybe it's time for a few direct questions," I suggested.

"You sure you want to hear the answers?"

"No," I admitted. "But I'd better ask them anyway." Squaring my shoulders, I took a step toward Suzenne—

And at that moment, the two guards suddenly came to life. Stepping to the center of the double doors, they each took one of the handles and pulled.

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Suzenne was beside us before the doors even started to open. "All right, here we go," she said. "Remember, don't be nervous. Ah—Scholar. Good; you made it."

I turned my head to see Kulasawa step into line between Suzenne and Rhonda. Her outfit was a surprise: a flowing-line jacket-blouse of a rich-looking brocade over a contrasting flare skirt. It made our transport-crew uniforms look positively shabby, I thought with vague resentment, and I wondered briefly why in the worlds a scholar would bring such an outfit on a trip between Angorki and Parex. But then, unlike the rest of us, she'd known what the *Sergei Rock*'s true destination was. "Where are the others?" she muttered to Suzenne.

"Not here," Suzenne said. "Don't worry about it. Everyone; here we go."

We walked forward in unison, crossing the rest of the foyer and stepping between the open doors.

My first impression of the room was that its tone fit the outer building much more than it did the ornate doorway leading into it. More like an expansive office than the way I would have envisioned a throne room, it was dominated by a large desk near the back wall. A few meters to our right, a semicircular couch that could comfortably seat eight people was positioned around a low circular table on which was a carafe and several glasses. Scattered around the room were a few free-standing lamps and sculptures on pedestals; on the walls were some paintings and textureds, tastefully arranged and spaced. Off to the left, almost looking like an afterthought, was a high-backed throne that had apparently been carved out of a single block of pale, blue-green stone.

And seated there waiting for us was King Peter.

He was a bit older than I'd expected—somewhere in his eighties, I guessed—clean shaven instead of with the bushy beard I'd sort of expected every self-respecting monarch automatically came equipped with. His clothing was also something of a disappointment: no crown and royal robes, but merely a subdued white suit with gold buttons and trim. Kulasawa's outfit, I thought uneasily, was going to make him look a little shabby, too.

"Welcome to the *Freedom's Peace*," he said, rising to his feet as we turned to face him. "I'm King Peter, titular ruler of this world. I trust you've been properly looked after?"

"Yes, sir, we have," I said, suddenly realizing to my chagrin that Suzenne hadn't given us any pointers in protocol. "I mean, Your Highness—"

"'Sir' will suffice, Captain Smith," he assured me, stepping up and offering me his hand. "I'm pleased to meet you."

"Thank you, sir," I managed, shaking his hand. "I'm pleased to meet you, too."

He smiled. "Actually, a simple 'Peter' will do, if you're so inclined," he said in a conspiratorial tone. "The citizens here like the idea of having a monarch, but we all have too much common sense to take the idea too seriously."

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He took a step to the side and offered his hand to Rhonda. "Engineer Blankenship," he nodded, shaking her hand. "Welcome."

"Thank you sir," she said. "You have a beautiful world."

"We like it," he said, moving to Kulasawa. "And Scholar Kulasawa. What do you think of the *Freedom's Peace*, Scholar?"

"It's more than merely beautiful," she said. "I'm looking forward to examining it in much more detail."

"You'll be given that chance," Peter promised gravely, waving toward the wraparound couch. "But please; let's be comfortable."

We crossed to the couch and sat down, Peter and Suzenne taking one end as the rest of us spread out around the curve, Kulasawa taking the far end. "I'm sure you have many questions about our world," Peter said as Suzenne began pouring drinks from the carafe. "If there's anything you'd like to know right now, I'll do my best to answer."

I took a deep breath. So he wanted questions. So OK, here it came. "I have one," I said. "Are we the first visitors you've had in the past fifty years?"

Peter and Suzenne exchanged glances. "An interesting question," Peter murmured. "A very interesting question, indeed."

"I thought so," I said, forcing my voice to stay steady. Whatever was going on here, that single glance had been all I needed to know I'd hit the target dead center. Whatever the hell the target was. "I'd like an answer, if I may."

A muscle in Peter's jaw tightened briefly. "As it happens, you're the fourth Expansion transport to find us," he said.

I felt Rhonda stir beside me. "And what happened to the other three?" I asked carefully.

"The crews are still here," Peter said, his gaze steady on me. "Most of them. There were two . . . fatalities."

"What kind of fatalities?" Kulasawa asked.

"They were killed trying to escape," Suzenne said. "I'm sorry."

"What do you mean, escape?" I asked.

"What she means is that you can't leave, my friends," Peter said quietly. "I'm afraid you're going to have to stay with us for the rest of your lives."

A lot of different thoughts go shooting through your mind when you hear something like that. My first thought was that this was some kind of strange joke Peter and Suzenne liked to play on visitors, that any second now they would smile and say, no, they were just kidding. My second thought was that the TransShipMint Corporation was going to be seriously unhappy if I disappeared without paying back their two hundred thousand. My third was that *I* wasn't going to be very happy either if I wasn't allowed to make that debt right.

And the fourth, which overrode them all, was that I was damned if I would walk meekly into this cage they were casually telling me to step into.

I kept my eyes on Peter, trying hard to think. Were the guards outside

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monitoring us? Probably not. Could Rhonda and I take out Peter and Suzenne? Probably. But that wouldn't get us across the colony and back to the *Sergei Rock*.

And even if we got there, would it do any good? There were still those InReds hanging around out there. We knew they scared away normal flapblacks—were they waiting like ghostly sharks to grab us and haul us to oblivion?

Rhonda was the first to break the silence. "I don't understand," she said. "You can't just order us to stay here.

"I'm afraid we have to," Peter said. "You see, if you leave you'll bring others back here. That's something we can't allow to happen. I'm sorry."

"Why not?" Kulasawa asked.

Frowning, I turned to look at her. My ears hadn't deceived me: her face was as calm and controlled as her voice.

Peter must have noticed it, too. "If you're expecting to be rescued, Scholar, I can assure you that the chances of that are vanishingly small. None of the other transports who came here ever had anyone come looking for them."

"And you think that means no one will come looking for us?" Kulasawa asked.

"Did you tell anyone else where you were going?" Suzenne countered. "Or where you would be looking for us?"

Kulasawa shrugged fractionally. "That's irrelevant."

"Not really," Suzenne said. "You see, we've learned from the other fortune-hunters that a prize like the *Freedom's Peace* tends to inspire great secrecy on the part of the searchers. All any of you want is to make sure you get all the profit or glory—"

"That's enough, Suzenne," Peter murmured. "Let me hasten to assure you that you'll all be treated well, with homes and jobs found for you—"

"Suppose we don't choose to roll over and show our throats," Kulasawa interrupted. "Suppose we decide we're not going to feed your megalomania."

Peter's eyebrows lifted, just a bit. "This has nothing to do with megalomania," he said. "Or with me."

"Then what *does* it have to do with?" Rhonda asked quietly.

"The fact that if the Expansion learns where we are, they'll want to bring us back," Peter said. "We don't want that."

Kulasawa frowned. "You must be joking," she said. "You'd kidnap us for *that?* Do you seriously think anyone in the Expansion cares a pfennig's worth for any of you?"

"If you think that, why are you here?" Peter asked, regarding her thoughtfully. "And please don't try to tell me it was in the pure pursuit of knowledge," he added as she began to speak. "The more I study you, the more I'm convinced you're not actually a scholar at all."

Kulasawa favored him with a thin smile. "One for two, Your Highness," she said. "You're right, I'm not a scholar."

I looked at Rhonda, saw my own surprise mirrored in her face. "Then who are you?" I demanded.

"But on the other point, you're

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dead wrong," Kulasawa continued, ignoring my question. "Pure knowledge is exactly the reason I'm here."

"I see," Peter said. "Any bit of knowledge in particular you're interested in?"

"Of course," Kulasawa said. "You don't really think I care about your little world and your quaint little backwater duck-pond monarchy, do you?"

"Yet you were willing to pay three hundred thousand neumarks to come here," Rhonda pointed out.

"Don't worry, I intend to get full value for my money," Kulasawa assured her coldly. "By the time I'm finished here, I'll have completely changed the shape of Expansion space travel."

There was a sort of strangled-off gasp from the other end of the couch. I turned that direction just in time to see Peter put a restraining hand on Suzenne's arm. "What do you mean by that?" the king asked, his voice steady.

"It should be obvious, even to you," Kulasawa said, regarding both of them with narrowed eyes. Clearly, she'd caught the reaction, too. "I want those ion-capture engines of yours."

"Of course," I murmured under my breath. It *was* obvious, at least in retrospect. The current limit on spaceship size was due solely to the limits in the power and size of their drives; and those limits were there solely because the Jovians's unique engineering genius had died with their bid for independence from Earth. Examination of the *Freedom's Peace*'s drive would indeed revolutionize Expansion space travel.

As I said, obvious. And yet, at the same time I felt obscurely disappointed. After all of Kulasawa's lies and manipulation, it seemed like such a petty thing to have invaded an entire world for.

But if Peter was feeling similarly, he wasn't showing it. In fact, I could swear that some of the tension had actually left his face. "I presume you weren't planning to disassemble them for shipment aboard your transport," he said. "Or did you think we would have the plans lying conveniently around for you to steal?"

"Actually, I was hoping to persuade you to come back with me," Kulasawa said. "Though the engines are my primary interest, I'm sure there are other bits of technological magic the Jovian engineers incorporated into the design of this place that would be worth digging out."

"I'm sure there are," Peter agreed. "But you already have our answer to that."

"But why *don't* you want to come back with us?" Rhonda asked. "We have true interstellar travel now—there's no need or reason for you to stay out here this way."

"She's right," I put in. "If you want your own world, I'm sure the Expansion could provide you with something."

"We already have our own world," Suzenne pointed out.

"I meant a real world," I said.

"So did I," Suzenne said. "You think of a world as a physical planet orbiting a physical sun; no more, no less. I think of a world as a group of people living together. I think of the society and culture and quality of life."

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"Our ancestors left Sol for reasons involving all of those," Peter added. "Don't forget, we've had three other visitors from the Expansion, from which we've learned a great deal about your current society. Frankly, there are things happening there we'd just as soon not involve ourselves with."

"Typical provincial thinking," Kulasawa said contemptuously. "Fear of the unknown, and a ruthless suppression of anything that might rock the boat of the people in power. And I presume that if I wanted to put my proposal to the whole colony you'd refuse to let me?"

"There would be no need for that," Peter said. "The decision has already been made."

"Of course," Kulasawa sniffed. "The glories of absolute monarchy. *Dieu et mon droit, ex cathedra*, and all that. The king speaks, and the people submit."

"The Citizens' Council agreed with the decision," Suzenne told her. "All the citizens understand our reasoning."

Kulasawa shrugged. "Fine," she said. "As I said, I'd hoped to persuade you. But if you won't come willingly, you'll just have to do so unwillingly."

Peter's forehead furrowed slightly. "An interesting threat. May I ask how you intend to carry it out?"

"As I said, I could start by addressing the people," Kulasawa said. "Give them a taste of real democracy for a change."

Peter shook his head. "I already said you wouldn't persuade them."

"Then why are you afraid to let me try?" Kulasawa countered. "Still, there's no reason to upset your well-trained sheep out there. All I really need to do is explain to you why you can't make me disappear as conveniently as you have all the others. Why there *will* be people who'll come looking for me."

I frowned at her, a sudden hope stirring within me. Up until that moment, it hadn't really sunk in on an emotional level that what we were discussing here was a permanent—and I mean *permanent*—exile to this place. If Kulasawa had some kind of trick up her sleeve that could get us home . . .

"By all means," Suzenne invited. "Tell us what sort of clues or hints you left behind."

"No clues or hints," Kulasawa said loftily. "Merely a simple matter of who I am."

"And who are you?" Suzenne asked.

And at that moment, the double doors behind Peter swung open again. I looked that direction to see Jimmy come into the room, his hair looking even more unkempt than usual. He must have missed seeing Peter and Suzenne, with their backs mostly to him; but he spotted me instantly. "Captain!" he said, bounding toward us as the doors closed again behind him.

I hissed under my breath, trying to gesture his attention to Peter without being obvious about it. Talk about your oblivious bull in a china shop—

But he was bubbling too hard to even notice. "Guess what?" he called, a huge grin plastered across his face as he came around the end of the

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couch. "These people can talk to the flapblacks!"

I froze, my gesturing hand still in midair. "What?"

"Yeah, they can talk to—" He broke step, suddenly flustered as he abruptly seemed to focus on the rest of the people seated in front of him on the couch. "Oh. Uh . . . I'm sorry. . . ."

"No, that's all right," I said, throwing a hard glance at Peter. But his face was unreadable. "Tell us more."

Jimmy's eyes darted around, his throat working uncertainly. "Uh . . . well, I was talking to one of their musicians," he said hesitantly. "And he said . . ."

His voice trailed away. "He said we can communicate mentally with the beings you call flapblacks," Peter said. His voice was calm again, and with a flash of insight I realized that this was the secret he'd thought Kulasawa had stumbled on earlier when she'd spoken of revolutionizing space travel. "We would have told you about it eventually."

"Of course," I said. "How about telling us about it now?"

He held his hands out, palm upward. "There's not much to tell," he said. "Our first hint was a few years out, when we began to realize that the supposedly imaginary friends our first-born children were telling their parents about were not, in fact, imaginary at all. It took awhile longer to realize who and what the beings were they were in contact with."

"And Jimmy said you *talked* to them?"

"A figure of speech," Peter said. "It's actually a direct mental contact, a wordless communication."

"Why didn't you tell the Habitats?" Kulasawa put it. "You must have still been in contact with Jupiter at that point."

"We were already beginning to fade," Suzenne said. "By the time we'd figured it all out, it would have been problematic whether we could have gotten enough of the message through."

"And besides, you thought it might be a useful secret to keep to yourselves?" Kulasawa suggested, smiling thinly.

Peter shook his head. "You don't understand," he said. "In the first place, it's hardly a marketable secret—any child who's conceived and brought to term away from large planetary masses will have the ability. Everyone aboard has it now, except of course for the handful of recent visitors like yourselves."

"That doesn't change the fact that it's an enormously useful talent," Kulasawa said. "You people don't need a musicmaster to get where you're going, do you? You just order the flapblack to take you where you want to go, and that's it."

"It's not like that at all," Suzenne protested. "They're not servants or slaves we can order to do anything. It's more like . . ." She floundered.

"I sometimes think of it as similar to those dolphin and whale shows they have on Earth," Peter said. "You train them by giving them a reward when they do something you want, but you aren't really *communicating* with them. In this case, you provide the reward—the music—concurrently with

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the action, but you have no real understanding as to who and what you're dealing with—"

"Let's put the philosophy aside for a minute," Kulasawa cut in brusquely. "Bottom line: you can tell them where to go and they take you there. Yes or no?"

Peter pursed his lips. "For the most part, yes."

He looked back at me. "You see now why we can't let even a hint of this get back to the rest of the Expansion. If they knew we could move their transports between the stars without the uncertainties and complications of the music technique, they would carry every one of us away into slavery."

Kulasawa snorted. "Give the melodramatics a rest, Your Highness. What you mean is that you've got a platinum opportunity here and you're just afraid to grab it."

"Believe whatever you wish," Peter said. "For you, perhaps, it would be an opportunity. For us, it would be slavery."

"You really think they would just take you away like that?" Rhonda asked. "I can't believe our leaders would allow that."

"Of course they would," Peter said, gesturing toward Jimmy. "Just look at your own musicmaster. The musicmaster on the first transport to find us was a forty-six-year-old former professor of composition. How old is Mr. Chamala?"

"Nineteen," I said, looking at Jimmy. "He has the right kind of mind, and they hustled him straight through school."

"Did he have a choice?"

I grimaced. "As I understand it, there's a great deal of subtle pressure brought to bear on potential musicmasters."

"Do you think it would be any different with us?" Peter asked quietly. "There's a virtual explosion in the volume of interstellar travel and colonization—just comparing the *Sergei Rock*'s planetary charts with those of our earlier visitors makes that abundantly clear. If they knew we could feed that appetite, do you really think they would hesitate to press us into service?"

"And do you have any idea what prices you could command for such service?" Kulasawa demanded. "That's what Smith's 'subtle pressure' mostly consists of: huge piles of neumarks. Play your cards right and your world could be one of the richest in the Expansion."

"And who would be left to live there?" Suzenne countered. "Children under five and elders over ninety? They'd take everyone else."

"Now you're being ridiculous," Kulasawa growled.

"I don't think so," Suzenne said. "But whether I am or not is irrelevant. The decision has been made, and we're not going to change it."

"Fine," Kulasawa said. "If you won't bring freedom to your people, Jimmy and I will have to do it for you."

Jimmy, who'd been largely frozen in place ever since planting himself near Peter's end of the couch, came unstuck in a rush. "Who—me?" he gulped, his eyes turning into dinner plates.

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"You're the only one who can help them, Jimmy," Kulasawa said, her voice abruptly soft and earnest. "The only one who can free them from the prison King Peter and his power elite have locked them into."

"Wait just a second," I protested. "If the people have decided—"

"The people haven't decided, Smith," Kulasawa cut me off scornfully. "Or haven't you been paying attention? What proportion of the people here, do you think, would jump at the chance to get out of this flying coffin and see the Universe?"

"We can't let even one of our people leave here," Suzenne said. "If there was so much as a single slip on anyone's part, the entire colony would be doomed to slavery."

"There's that slavery buzz-word again," Kulasawa scoffed. "Do you feel like a slave, Jimmy? Well, do you?"

Beneath that mop of hair Jimmy's face looked like that of a cornered animal, his eyes darting around as if seeking help or a way to escape. "But if they don't want to do it—"

"Do you feel like a slave?" Kulasawa repeated sharply. "Yes or no?"

"Well . . . no . . ."

"In fact, you're extremely well paid for what you do, aren't you?" Kulasawa persisted. "And with opportunities and privileges most teens your age would give their left arm to have." She stabbed an accusing finger at Peter and Suzenne. "And *that's* what these people are afraid of. They've been the big ducks in the small pond all their lives. And they know the only way to hold onto that power is to keep their people ignorant."

Her lip twisted. "Slavery, you said, *King* Peter? *You're* the real slavemaster here."

"But what can I do?" Jimmy asked plaintively, his expression still looking hunted. "If they won't let us leave—"

"You can save them, that's what," Kulasawa told him. "You see, those plates I had aboard the *Sergei Rock* aren't deep-probe sonics. They're actually highly sophisticated monodirectional resonance self-tuning loudspeakers. Loudspeakers which are at this moment scattered at strategic points all around this asteroid."

She reached her left hand beneath her brocaded jacket-blouse and pulled out a small flat box. "And *this* is a wireless player interface to them."

"You can't be serious," Rhonda said, a sandbagged look on her face. "You want to take the whole colony back?"

"Can you think of a simpler way to solve the problem?" Kulasawa asked. "The choices will be presented to the citizens, and they'll be allowed to decide for themselves what they want to do. Those who want to enter the musicmaster profession—I suppose we'll have to come up with a new name for them—can do so. Those who don't can go on to new homes or the world of their choice."

Rhonda glanced at Peter and Suzenne, looked back at Kulasawa. "And the *Freedom's Peace*?"

"As I said, there are technological secrets here that will benefit the whole Expansion," she said. "The colonists will be properly compensated, of course."

"And what makes you think our

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people will just sit by and let you do this?" Peter asked.

"The fact that we can do it without leaving this room," Kulasawa said, her right hand dipping beneath her jacket-blouse. "And the fact that I have this."

I looked at the tiny gun in Kulasawa's hand, a sudden hollow sensation in the pit of my stomach. "It's called a Karka nerve pistol," Kulasawa continued, her tone almost off-handed. "It fires needles that dissolve instantly in blood, disrupting neural chemistry and totally incapacitating the target. Usually nonfatal, though an allergic reaction to the drug will kill you pretty quick."

There was a soft click as she moved her thumb against the side of the gun. "There's also a three-needle burst setting," she added. "That one *is* fatal."

She clicked back to the one-needle setting. "We can all hope that won't be necessary. All right, Jimmy, come over here and take the interface. Be sure to stay out of my line of fire."

Jimmy didn't move. His eyes darted around the couch one last time—

And stopped on me. "Captain?" he whispered.

"You don't need to ask him," Kulasawa said. "*You're* the one who holds the key to these people's freedom, not him."

"It's not our decision to make, Jimmy," I said quietly, knowing even as I said it how futile my words were. If there was one button guaranteed to start Jimmy's juices running it was the whole question of personal freedom versus authority. Stupid rules, restrictive rules, unnecessary impositions of power—I seemed to go around that track with him at least once per trip. Kulasawa couldn't have come up with a better way to trip him to her side if she'd tried.

And then, to my eternal amazement, Jimmy squared his shoulders, turned to face her, and shook his head. "No," he said. "I can't do it."

From the look on her face, Kulasawa was as stunned by his answer as I was. "What did you say?" she demanded.

"I said no," Jimmy said. His voice quavered slightly under the blazing heat of her glare, but his words were as solid as a sealant weld. "Captain Smith says it's wrong."

"And *I* say it's right," Kulasawa snapped. "Why listen to him instead of me?"

"Because he's my boss." Jimmy looked at me. "And because I trust him."

He turned back to Kulasawa. "And because he's never needed a gun to tell me what to do."

Kulasawa's face darkened like an approaching storm. "Why, you stupid little—"

"Leave him alone," Rhonda cut her off. "Face it: you've lost."

"Sit down, Chamala," Kulasawa growled, gesturing Jimmy toward the couch. "And if I were you, Blankenship, I'd keep my mouth shut," she added to Rhonda, all her heat turned to crushed ice now. "Of all the people in this room, you're the one I need the least."

She looked back at Peter, her face under control again. "Fine; so our lapdog of a musicmaster is afraid to make

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decisions like a man. I'm sure one of your musicians out there will see things differently. Where's the room's public-address system?"

Peter shook his head. "No," he said.

Kulasawa shifted her gun slightly to point at Suzenne. "I don't need her, either," she said.

Peter's lips compressed briefly. "In the throne. Controls are along the side of the left armrest."

"Thank you." Standing up, Kulasawa started to circle around the table.

I cleared my throat. "Excuse me, but there's just one little thing you seem to have forgotten."

Kulasawa stopped, her gun settling in to point at my chest. "And that is?"

"One of their musicians might be able to whistle up some flapblacks for you," I said. "But none of them can tell you how to get back to the Expansion."

The gun lifted a little. "I'm disappointed, Smith—I would have thought you could come up with something better. I've got the *Freedom's Peace*'s coordinates, remember? All I have to do is work backward from those and we'll wind up back at Angorki."

"We would," I agreed, "*if* we were anywhere near your coordinates. But we're not."

Her eyes narrowed. "Explain."

"Your coordinates didn't take into account the time-delay for the light," I explained. "Or the fact that the *Freedom's Peace* is no longer on a Sol-direct vector. You try a straight backtrack and you'll miss Angorki by about sixty A.U. That's about twice the distance from Earth to Neptune, in case you need help with the numbers."

For a long moment she studied my face. Then, her lips tilted in a slight smile. "And of course you're the only one who knows how to plot a course back, right?"

"Right," I said, folding my arms across my chest. "And I'm not going to."

"I suggest you reconsider," she said. "There's a little matter of two hundred thousand neumarks you owe the TransShipMint corporation."

The bottom seemed to fall out of my stomach. "How do you know about that?"

She snorted. "Oh, come now—you didn't really think I pulled your name out of a lotto ball, did you? You were one of a dozen transports I knew I could bring enough pressure on to get what I wanted. You just happened to be in the right place and the right time when the data finally came through."

I shrugged as casually as I could. "So fine. Renege on the seventy thousand if you want. What do I care—Peter says we're staying here anyway."

"Wrong," Kulasawa bit out. "One way or another, we're getting back." She arched her eyebrows. "And when we do, you're going to prison . . . because you don't owe just seventy thousand any more. You owe the full two hundred."

I stared at her. "What are you talking about?"

"I'm talking about the hundred thirty thousand you thought you had stashed away in the Star Meridian Bank," she said, openly gloating now.

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"The hundred thirty thousand that isn't there any more.

"You're bluffing," Rhonda said sharply. "How could you possibly get that kind of access to Jake's account?"

"For the same reason these people can't keep me here for long." Kulasawa straightened up slightly and looked around—

And as she did so, her face and posture and entire demeanor abruptly changed. Suddenly the upper-class scholar was gone; and in its place was someone or something that seemed far more regal even than the king seated at the end of the couch. "My name isn't Andrula Kulasawa," she said her voice rich and commanding. "It's Andrula Chen."

She turned hard, arrogant eyes on me. "Second cousin of the Chen-Mellis family."

I stared at her, my blood seeming to freeze in my heart. "Oh, my God," I whispered.

"Captain Smith?" Peter asked, his voice low. "What does she mean?"

With an effort, I turned away from her gaze. "Chen-Mellis is one of the Ten Families," I said, the words coming out with difficulty. "The people who effectively rule Earth and most of the Expansion."

"I prefer to think of it as one of the Six Families, actually," Kulasawa—Chen, rather—put in. "The other four survive solely at our pleasure."

"You told us there were other groups looking for the *Freedom's Peace*," Rhonda said, her voice low. "The other families?"

"You don't think I would have picked the *Sergei Rock* to hide from some bumbling academics, do you?" Chen retorted. "Members of the Hauptmann and Gates-Verazzano families have been sniffing along my trail for the past two months."

She gave Peter a brittle smile. "They want your engines, too," she added. "And I can assure you that Chen-Mellis will cut you a better deal than they will."

Peter shook his head. "We will deal with none of you."

"I'd love to see you try to persuade the Hauptmann family of that." Chen looked back at me. "Well, Smith? Cooperation and a share of the profits, or lofty ideals and a few years of your life in prison?"

"So now it's a share of the profits, too?" Suzenne murmured.

"Shut up, or I'll add your lives on the downside of the ledger," Chen snarled. "Well, Smith, what's it to be? Shall we say your freedom and, say, five million neumarks?"

I should have been tempted. After five years of scrimping every pfennig I got to put toward my debt, I should *really* have been tempted. But to my own amazement, I discovered that I wasn't. Maybe it was the condescension inherent in the offer, the casual assumption that I had my price just like everyone else she'd ever met. Or maybe it was the presence of Jimmy, sitting on Rhonda's other side now, who'd already resisted the pressure and made the right decision.

Or maybe it was the fact that I'd suddenly had an idea of how we might be able to get out of this. If I played my cards right. . . .

I looked Chen straight in the eye.

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"Forget it," I told her. "And if you're thinking about upping the ante, save your breath. You're on your own here, lady. None of us are going to help you."

Her face had frosted over again at my refusal. Now, though, the ice cracked into a small but malicious smile. "Perhaps none of you three will," she said. "But you're not the only one who knows how to get us back to civilization. And I suspect First Officer Hobson will be more easily convinced of the realities of this situation."

Keeping her eyes on us, she began backing toward the throne and King Peter's public address system. Mentally, I crossed my fingers. . . .

And then, abruptly, she stopped. "No," she said. "No, I see your game, Smith. You're hoping that anyone using the PA system except His Royal Highness will make the local secret police suspicious." She waved the gun toward the throne. "On the other hand, you're his captain, aren't you? What could be more natural than for you to call him to the Palace?"

I didn't move. "And how much were you planning to offer me for this service?"

"I wouldn't dream of insulting you that way again," she assured me, her voice not quite covering up the soft click as she shifted her gun to its three-needle setting. "So let's make it simple. You call Hobson, and Blankenship gets to live."

I felt my throat tighten. "You wouldn't dare."

"I've already said I don't need either her or Ms. Enderly," Chen reminded me. "In a pinch, I could probably do without the king, too."

I took a deep breath, exhaled it noisily, and got to my feet. "Don't do it, Jake," Rhonda pleaded. "She's bluffing—even the Chen-Mellis family couldn't get her off a murder charge."

"The Chen-Mellis family can do anything when the rewards are big enough," Chen said shortly.

"It's not worth the risk," I told Rhonda, reaching down to briefly squeeze her hand. "Besides, even if I don't, Bilko will be here eventually anyway."

The throne was more comfortable than it looked, with silky-soft cushions fitted to the stone. The controls on the left armrest were simple and straightforward: one basic on/off switch, one that determined whether or not the audio was accompanied by a visual, and five switches determining which section or sections of the colony would receive the broadcast. I set the latter group for full coverage, set the mode for audio only—this at Chen's insistence—and we were ready. "No tricks," she warned, stepping back well out of range of any desperate flying leaps I might have been contemplating. "Bear in mind this gun has a clip of just over two hundred fifty needles, and that I don't mind spending a few of them if I have to."

I cleared my throat and touched the "on" switch. "Attention; attention," I called. "First Officer Will Hobson of the *Sergei Rock*, this is your captain speaking. We're having a little party over here at the Palace you seem to have forgotten about. Greet the other cardsharps for me and hustle it over

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here, all right? Thank you; that is all."

I switched off the PA and stepped down from the throne. "Happy?" I asked Chen sourly.

"What was that nonsense about a party and cardsharps?" she demanded, her face dark with suspicion.

"It's a private joke," I said briefly, striding past her and dropping onto the couch next to Rhonda.

"Make it a public joke," Chen ordered.

I could feel Rhonda's eyes on me, and could only hope she wasn't frowning too hard at this private joke she'd never heard of. "It goes back to a time on Bandolera when I got him into some trouble," I said. "I called him while he was in the middle of a game and told him to get back to the transport. He was winning big, and said he wouldn't be back until he'd finished the round. He turned off his phone; so I tracked down the numbers of the other players and started calling them and telling them to please send Bilko home."

"I imagine he was immensely pleased by that," Chen said.

"I don't think he ever lived it down," I said. "At least, not with that bunch. The point is the reference means he's to get his rear over here *now*, and not just whenever he finishes the current round or has won enough money or whenever."

Chen lifted the gun warningly. "He'd better."

"He will," I sighed, mentally crossing my fingers a little harder.

Peter cleared his throat. "I'm curious, Miss Chen," he said. "When you spoke earlier of changing the shape of Expansion space travel with our engine design, I naturally assumed a certain degree of exaggeration. Now that we know your true affiliation, do I now assume you were speaking literally?"

"Quite literally, Your Highness," Chen told him. "In ten years, the Chen-Mellis family is going to completely dominate intrasystem space travel. We're going to create super tankers, mining ships like no one's seen since the Jovian Habitats went down, passenger liners ten times bigger than the *Swan of Tuonela*—"

"And warships?" Rhonda asked quietly.

Chen didn't even flinch. "Of course we're going to need to defend our interests," she said. "I don't anticipate any actual warfare, though."

"Of course not," I said sarcastically. "Subtle threats and economic pressure bring the same results without making so much of a mess, don't they?"

Chen shrugged. "You learn slow, Smith. But you do learn."

"Possibly faster than you do," I said. "Has it occurred to you that there may be a limit to how big a ship the flapblacks are going to be able to carry?"

"Of course it has," she said. "That's another reason why I want to try to bring the colony back with me. If they can carry the *Freedom's Peace*, then the sky is very literally the limit."

From across the room came the whisper of air that signaled the opening of the double doors. Chen spun around to face that direction, dropping her arm to her side to conceal the gun against the back of her right

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thigh. I felt my muscles tense, reflexively estimating the distance to her gun and the chances I could get there before she could aim and fire. . . .

Obviously not as subtly as I'd thought. "Don't, Jake," Rhonda hissed into my ear, gripping my arm. "It's still set on three-needle."

"Hello, everyone," Bilko said, wandering almost casually into the room. Wandering in alone; and even as I tried to catch a glimpse of anyone else who might be out in the foyer, the doors swung shut again. "Sorry to be late, Jake—my game went a little longer than I'd expecte—"

He broke off as his eyes landed on the gun Chen had brought back into view again. "Relax, Hobson, it's not what it seems," she assured him. "My name is Andrula Chen, second cousin of the Chen-Mellis family, with the mission of bringing this colony back to the Expansion. Unfortunately, the power structure here is resisting me, and I'm going to need your assistance."

"Well . . . sure," he said, throwing a puzzled look at the rest of us on the couch. "Jake?"

"Captain Smith wanted more than his assistance was worth," Chen said. "He demanded ten million neumarks; I could only offer five."

She looked at me as if daring me to contradict her. But though her eyes were on me, her gun was pointed at Rhonda. I held her gaze, and kept my mouth shut.

Bilko snorted derisively. "Five million neumarks not good enough, huh? Well, that's management for you. OK, Ms. Chen, you've got yourself a deal. What do you need me to do?"

"I need you to plot us a course from here back to Angorki," she said. "Can you do it?"

"Sure—no sweat," he said, glancing around and starting toward the desk. "I just need a computer—there must be one back here somewhere."

And across at Peter's end of the couch, Suzenne suddenly inhaled sharply.

Chen heard her, too. "Just a minute," she snapped, throwing a suspicious glare at Suzenne. "What was that all about?"

Suzenne seemed to shrink back into the cushions. "What was what?"

"What's over there at the desk?" Chen demanded.

"Nothing," Suzenne said guardedly. "What could be there?"

"Yeah, what could be there?" Bilko agreed, taking another step toward the desk. "Computer's probably in one of these drawers, right?"

"Get away from there," Chen said sharply, spinning back to face him. "I said *get away*."

"Sure, OK," Bilko said, taking a hasty step back and holding up both hands. "What's the problem?"

"Maybe you're a little too cooperative." Chen threw me a hard look. "And maybe there was more to Smith's private joke than he let on. Move away—*I'll* find the computer."

"Whatever you say," Bilko shrugged, taking another step back. Chen circled around behind the desk, clearly trying to watch all of us at once. She pulled the desk chair out and half stooped to pull open one of the drawers—

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The thick glass panels were so perfectly transparent and moved so fast that they were almost impossible to see. But there was no missing the sudden thundercrack as they slammed out of disguised cracks in the floor and thudded solidly against the ceiling, sealing the desk and the area around it into its own isolated space.

Chen's curse—I assume she cursed—was lost in the echo of that boom, as was the sound of her shot. She ducked reflexively back as the needles ricocheted from the barrier; and then the guard who'd come through the doorway that had magically appeared in the wall behind the desk was on her, the momentum of his diving tackle slamming her hard against the glass. By the time the second and third guards made it through the door, she had run out of fight.

"Don't hurt her," Peter called. We were all on our feet now, though I personally couldn't recall having stood up. "Take her to a holding cell."

"Make sure you search her first," Suzenne added. "Thoroughly."

They hustled her out through the hidden door, and Peter turned back to me. "Thank you," he said quietly. "However you did it, we're in your debt."

"No problem," Bilko assured him, coming up to join us. "When Jake says to whistle up the cops, I whistle up the cops." He looked back toward the desk, watching as the glass panels receded back into the floor. "Now that it's over, can someone tell me what I just blew five million neumarks over?"

"The biggest attempted hijacking in history," I said, looking at Peter. "And unfortunately, it's not over yet."

"You really think her people will be coming to look for her?" Suzenne asked.

"It's worse than that," I said grimly. "The implication she's out here alone is nonsense—no Chen-Mellis second cousin would be stupid or reckless enough to come out here without backup already on its way. My guess is we've got maybe two or three days before they get here. Maybe less."

"Wait a minute, wait a minute," Bilko cut in. "If they're that close, why didn't she just wait for them in the first place? Why bother coming in with us?"

"Because there are other people looking for the *Freedom's Peace*," I told him. "And the first one to get here is going to be the one with salvage rights claim. Odds are that those loudspeakers she scattered around the colony really are also recorders, just like she said, so that she'll have a record of her presence here."

"But then why didn't she wait for her people to arrive before revealing herself to us?" Peter asked, clearly confused. "Why risk tipping us off the way she did?"

"Pure arrogance," Rhonda suggested. "She wanted to deliver you personally to the backup team."

"Or else she wanted to be the one who got the flapblacks to get you moving," Bilko put in. "Maybe there's even some rivalry between her and the backup team—the Ten Families are supposed to be riddled with upper-level infighting. If she got the *Freedom's Peace* back to Angorki on

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her own, she'd look that much better."

"The reasons and motivations don't matter," I interrupted the budding debate. "The bottom line is that we've got trouble on the way."

"I can't allow my people to be forced into servitude, Captain," Peter said softly, the lines in his face deepening. "If it comes to that choice, we will fight."

"Let's see if we can't find a third choice," I said. "Tell me about those flapblacks that surround the colony, the ones who chase away the others. What are they, predators of some kind?"

Peter smiled sadly. "Hardly. They're merely the eldest of the Star Spirits. The ones marking their last few weeks as they wait for death."

An unpleasant shiver ran up my back. I knew all creatures died, of course, and in fact we'd had that argument on the way in over whether our wrapping flapblacks were getting eaten. But somehow the thought of a group of aging flapblacks hovering together waiting quietly to die was more disturbing than I would have expected it to be. Perhaps it took some of the magic away, or perhaps it felt too much like the death of a favorite pet.

"Like all Star Spirits, they enjoy music," Peter continued quietly. "But of a particular kind, the kind only we apparently know how to write for them. That's what the music in the colony is for."

Abruptly, Suzenne looked at me and smiled. "One of them remembers you, Captain. He says he carried you once a long time ago."

A second chill ran through me. "They get into our minds?" I asked carefully. "Not just the musicmaster's, I mean, but all the rest of us, too?"

"No, they can't read minds, Captain," Peter assured me. "Not even ours, and we're as attuned to them as any humans have ever been. No, they simply recognize you by the shape of your minds, just as you recognize them by the spectra of their passing."

"I see," I murmured. Like a favorite pet, I'd just thought. Only which of us was the pet? "So why do they drive the other flapblacks away?"

"They don't," Suzenne said. "The others stay away out of respect for the dying."

I scratched my cheek. Bits and pieces of a nebulous plan were starting to swirl together in my brain. "Does that mean that if you asked them to move aside for awhile and let the younger ones in, they would do it?"

Peter shook his head. "I know what you're thinking, my friend. But it won't work."

"Well, *I* don't know what he's thinking," Jimmy spoke up.

"It's simple, Jimmy," I told him. "Cousin Chen went to a lot of trouble to scatter all those loudspeakers around the colony. I think it would be a shame to waste all that effort."

"But it won't work," Peter repeated. "We've talked with the Star Spirits about this. They simply aren't strong enough to carry the *Freedom's Peace*."

"Maybe," I said. "Maybe not. You say you've talked to them, but you

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didn't say you've played music for them."

"Are you suggesting we *force* them to carry us?" Suzenne demanded, an ominous glint in her eye.

"It's not a matter of forcing," I said. "They enjoy the music—you know that as well as we do. I think it acts like a stimulant to them."

"So now you're suggesting we effectively drug them—"

"Excuse me," Rhonda put in gently. "Your Highness, how long have you been providing music for the dying flapblacks to listen to?"

"Quite a few years," Peter said, frowning. "All of my lifetime, certainly."

"And how often during those years have you had a younger flapblack carry any of you anywhere?"

He shrugged. "Three or four times, perhaps. But those were only our small scout ships. Not nearly as big even as your transport."

"Then perhaps that's the real problem," Rhonda said. "You can talk to the flapblacks, but your perception of them has been skewed by the fact that most of the time you're talking to the old and dying, not the young and healthy."

"You talked about whale and dolphins earlier," I put in. "I suggest a better analogy might be dogs."

"Dogs?" Peter asked.

"Yes." I waved a hand around. "You've been surrounded for decades by aging, crippled Chihuahuas. That's not what most of the flapblacks are like."

"And what are they like?"

"Big, exuberant malamutes," I told him. "And with all due respect, your people may understand them, but we know how to make them run."

For a moment there was silence. Then, with a sigh, Peter nodded. "I'm still not convinced," he said. "But you're right, it has to be tried."

"Thank you." I turned to Jimmy. "Go take a look at that player interface of Chen's and see what kind of music she's got programmed onto it. Then get in touch with that musician you were visiting this morning and have him whistle up the colony's whole music contingent.

"We're going to have ourselves a concert."

The Grand Center of the Arts was considerably smaller than I would have expected for a place with such an impressive title, though considering the colony's limited populace I suppose its size made sense. The main auditorium was compact but with a feeling of spaciousness to it and a main floor that would supposedly seat two thousand people.

We were only going to need a fraction of that capacity tonight. Gathered together by the front of the stage were Jimmy and the sixty-eight colonists he'd been able to sift through his impromptu musicmaster screening test in the past six hours. Above them in the balcony, I waited with Peter and eighty hand-picked colonists who were considered especially in tune with the flapblacks. Star Spirits. Whatever.

A motion down at the stage caught my eye: Jimmy, his final instructions completed, was giving me the high

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sign. I waved acknowledgment and keyed the radio link Suzenne had set up to the *Sergei Rock* in its hangar slot. "Bilko? Looks like we're about ready here. You all set?"

"Roger that," he confirmed. "Inertial's all calibrated and warmed up. If you get this chunk of rock moving, we'll know it."

"OK," I said. "Stand ready."

I stepped over to Peter, standing alone at the balcony rail gazing down at the musicians gathered below. "We're all ready, sir," I said. "You can give the order any time."

He smiled faintly, a smile that didn't touch his eyes. "You give the order, Captain. It's your show."

I shook my head. "It may be my show. But it's your world."

His smile became something almost sad as he turned to face the others on the balcony. "Your attention, please," he said. "We're ready. Tell the Ancients it's time, and ask them to move away from the colony."

For a long moment there was silence. Then Peter turned back to me and nodded. "It's all clear," he said. "They may begin."

I looked down at Jimmy and raised my hand. He nodded and fiddled with something on Chen's player interface; and faintly from the tiles beneath my feet I heard the drone of the C-sharp pre-music call. A few seconds later the tone was replaced by the opening brass fanfare of the first movement of Tchaikovsky's Fourth Symphony.

I waited a few bars, then keyed my radio link. "Bilko?"

"Yeah, I can hear the music," he said. "I had a flapblack shoot past, I think, but so far—wait a second. I thought the inertial . . . yeah. Yeah, we're off. Moving in fits and starts, but we *are* moving."

"What do you mean, fits and starts?" I asked frowning. "Aren't they getting a good wrap?"

"When they've *got* the wrap, they seem to have it pretty solid," Bilko said. "They just keep losing it, that's all. Either they keep unwrapping because Jimmy's people aren't very good at this, or else we're just too big to lug very far at a time."

"I can understand that," I said. "I've done my share of helping friends move across town."

"Yeah, me too," Bilko said. "And you have to admit this place *is* the ultimate five-section couch."

"True," I said. "But we're putting some distance between us and Chen's coordinates, and that's the important thing."

"Right," Bilko agreed. "We can sort out the details later. How long are you planning to run?"

I looked down at Jimmy's people, hunkered down and visibly concentrating on the music. "Just the first movement, I think," I told him. "Eighteen and a half minutes should be plenty for this first test."

"Sounds good. Let me know when to shut down the recorders."

"Sure."

I keyed off and looked around for Peter. He had moved off to an unoccupied part of the balcony while I was talking to Bilko and was again standing alone gazing down at Jimmy's people. Avoiding the small clumps of quietly conversing colonists

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that had formed around us, I crossed to his side. "It seems to be working, Your Highness," I told him. "A little slow, but we're making progress."

"I'm glad to hear it," he murmured, his eyes still on the musicians. "I wish I could say I was grateful for your help, Captain. Unfortunately, I can't."

I nodded. "I understand."

He gave me an odd look. "Do you? Do you really?"

"I think so," I said. "Up until a few minutes ago you had no decisions to make about the life of your people. You were sealed inside the *Freedom's Peace*, stuck in the empty space between stars, with nowhere else to go even if you'd wanted to."

I turned away from his eyes to look down at Jimmy. "But all that's changed now. Suddenly the whole galaxy is open to you . . . and you're going to have to decide whether you're willing to take the risks and challenges of finding and colonizing a new world for yourselves as your designers intended, or stay all nice and comfortable in here."

"We've always known that decision would eventually have to be made," Peter said quietly. "But until that first transport arrived it was something we expected the people ten generations down the line to have to deal with. I'm not at all sure my people are ready for this. Not sure *I'm* ready for it."

"I doubt King Peter the Tenth would have felt any more ready than you do," I said. "For whatever that's worth."

"To be honest, not very much," Peter conceded. "I'm very much afraid the colony is going to split, and split violently, over the decision."

He straightened up. "Still, humanity has been dealing with violent disagreements for a very long time now, and we've certainly had our fair share of lesser controversies aboard the *Freedom's Peace*. Hopefully, we'll find our way through this one, too."

"And remember that it'll be you who makes the decision, not someone from the Chen-Mellis family," I reminded him. "That's worth something right there."

"Yes." He eyed me. "Which brings up the question of what we are to do with her."

"You can't keep her here," I said. "Not unless you keep us here with her. She's sure to have left a complete data trail for her backup and the rest of the family to follow, including her plan to come aboard the *Sergei Rock*. If we show up anywhere in the Expansion without her, our necks will be for the high wire."

"The problem is that you're not going to do much better if you do show up with her," Peter pointed out darkly. "She's a highly vindictive person, my friend, and you've not only robbed her of a great prize but humiliated her in front of other people. At the very least, she'll make sure you go to prison; at the worst, she might conceivably have you murdered."

I shook my head. "She won't have any of us murdered," I told him. "If she'd brought back the *Freedom's Peace* I have no doubt the Chen-Mellis family would have given her cover for any illegal act she'd done along the way. But she has no prize now, and

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none of the Ten Families support unnecessary and unprofitable violence by one of its members. Aside from the bad publicity involved, it leaves them wide open to blackmail from the other families."

"Perhaps," Peter said, not sounding convinced. "You know Expansion politics better than I do. Might she still do something against you on her own, though, without family support or knowledge?"

"That's possible," I said. "The trick is going to be to persuade her that she personally will suffer greatly if she tries anything."

Peter shook his head. "I don't know. I've met people like Miss Chen, and I suspect her pride would outweigh even threats against her life."

"Probably," I said. "But I think there are things a person like Chen would value more even than her life."

Peter regarded me thoughtfully. "That sounds like you have an idea."

I shrugged. "An idea, yes. But the execution of it is going to depend solely on you and your powers of persuasion."

Peter lifted his eyebrows. "I doubt seriously my powers are strong enough to persuade Miss Chen of anything."

"Actually, that's not who you have to persuade," I told him. "Here's what I have in mind. . . ."

We convened in Peter's office in front of the throne—a more impressive locale, Peter had decided, from which to deliver his pronouncements than anywhere else in the colony.

If either of us was expecting Chen to have been subdued by her two days of confinement, we were disappointed. She stood stiff and erect in the drab prison clothing they'd given her, her head held high and her eyes smoldering with hidden fire. Proud, confident, and defiant; and if this didn't work, I was definitely going to be in for some big trouble down the line.

"So you've come to your senses after all," she said to Peter. "A wise move. My people will be coming back here regardless, of course; but if they'd had to come for the purpose of rescuing a kidnapped family member there would have been far less of this place left afterward for you to bargain with."

"I'm afraid you misunderstand, Miss Chen," Peter said. "You're not being released because I'm worried about reprisals from your family. You're being released because you and your family are no longer a threat to us."

Chen smiled cynically. "No, of course not. That's all right—you go ahead and tell your people whatever you have to."

"You're no longer a threat," Peter went on, "because we are no longer where you can find us."

The smile remained, but Chen's eyes narrowed. "And what's that supposed to mean?"

"It means that your idea of using speakers and music to call the Star Spirits worked quite well," he told her. "We've had four sessions in the past two days, and are now a considerable distance from the spot you first directed Captain Smith to."

Chen threw me a dagger-edged glance. "And you think that's all it

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takes to hide from the Chen-Mellis family?" she bit out. "You have no concept whatsoever of the scope of our resources."

"None of your resources will do you any good," Peter said. "Not only do you not know where to look for us, you also don't have anything to look for. Those wonderful ion-capture engines you covet so much have been shut down."

A muscle in Chen's cheek twitched. "You can't keep them off forever," she pointed out. "Not if you ever want to get anywhere. You'll have to decelerate sometime."

"True," Peter said with a shrug. "But we're in no particular hurry. Besides, by the time we begin our deceleration, you won't have even the faintest idea where to look for us."

"Perhaps," Chen said, her voice calmer than I would have expected under the circumstances. "But I'd warn you against the mistake of underestimating us."

"You're welcome to try," Peter said. "Still, I'd warn *you* against making any promises to your cousins just yet. Captain Smith tells me the Chen-Mellis family has a reputation for vindictiveness when they don't get what they've been promised."

Chen looked at me again. "Captain Smith will soon be a position to find out about that first hand."

"I don't think so," Peter said, shaking his head. "There is one final condition for your release: that you leave Captain Smith, his transport, and his crew strictly alone. No reprisals, no revenge, nothing."

Chen cocked her head. "An interesting demand. And if I decide to ignore it, what do you intend to do? Smother me with moral outrage?"

"Actually, we have a somewhat more effective demonstration prepared," Peter told her. "I'm told you were on your way to Parex when you diverted the *Sergei Rock* to come here. Do you know anything about that world?"

"It's the dregs of the backwater," Chen said, not bothering to conceal her contempt. "One city, a few small towns, and the rest just farms and useless alien wilderness."

"I doubt that it's quite that bad," Peter said. "It surely must have its own unique charms. Regardless, you'll have plenty of time to find out."

"Meaning?"

"Meaning that once you reach Parex, you won't be allowed to leave for a few weeks," Peter said quietly. "Or had you forgotten we're able to talk to the Star Spirits?"

Chen had her expression under good control, but there was no way for her to stop the blood from draining from her face. "You're bluffing," she said.

"It's already done," Peter told her gravely. "Once you reach Parex, the Star Spirits will refuse to wrap any transport that you're aboard."

Her eyes darted to me, as if seeking evidence that this was some elaborate trick. "I don't believe you," she snarled defiantly. "You can't have talked to that many flapblacks. Besides, they're aliens—they can't possibly recognize individual human beings."

"I don't expect you to take my word for it," Peter said. "By all means,

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try it for yourself."

His forehead darkened. "And as you do, I suggest you consider all of the implications of this demonstration. The Star Spirits see everything that happens in deep space, and we of the *Freedom's Peace* are in continual contact with them. Just because we're multiple light-years away doesn't mean we're out of touch, or that we can't call further retribution down on you. On you, or on the entire Chen-Mellis family."

For a long moment, Chen held that gaze unflinchingly. Then, almost reluctantly, she dropped her eyes. "Fine," she growled. "I'll play your game." She turned a glare on me. "Besides, I don't have to lift a finger to drop Smith down the sewer. The TransShipMint Corporation will be handing out all the revenge I could ever want."

I swallowed hard, trying not to let it show. I still had the money card she'd given me; but after paying off all the cargo and penalty clauses from this trip, I'd be lucky to clear the seventy thousand neumarks she'd originally promised me. Unless I could track down that hundred thirty thousand she'd ghosted out of my account—

"And if I were you I wouldn't count on digging up your bankroll in time," Chen said, reading my face despite my best efforts. "I'm the only one who can retrieve it . . . and according to His Highness here, I'm going to be stuck on Parex for a few weeks."

She looked at Peter. "Unless, of course, you want to call off your little demonstration. If not, he's going to prison."

Peter looked at me. "Captain?"

I shook my head. It was, we all knew, her one last chance to manipulate me, and I wasn't in any mood to be manipulated. "I appreciate the offer, Ms. Chen," I said. "But I think you need King Peter's object lesson. I'll take my chances with TransShipMint."

The cheek muscle twitched again. "Fine," she said. "I'll do my few weeks on Parex; you can do your ten years in prison. We'll see which of us gets the last laugh."

She waved a hand impatiently. "If you're finished with your threats, I'd like to get going. I have a life back in the Expansion, Smith here has charges of embezzlement to face; and you of course have some serious cowering to do."

"We are indeed finished," Peter confirmed with a nod. "Farewell, Miss Chen."

The ten-hour trip back to Parex was very quiet. Chen stayed in the passenger cabin with the hatchway sealed the whole time, while Jimmy, Rhonda, and I spent most of our time at our respective stations. Only Bilko took any advantage at all of the dayroom. He reported it as being pretty lonely in there.

The intended recipients of the cargo we'd left behind on the *Freedom's Peace* were not at all happy with the *Sergei Rock*'s empty cargo hold. I think Chen was hoping they would press charges, but application of the assets on her cash card—along with a little smooth talking on Bilko's part—got them sufficiently calmed down. It

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did, however, leave us with only sixty thousand neumarks, a far cry from the two hundred thousand TransShipMint was going to want in the next couple of weeks.

We were on Parex for about twenty hours, catching up on sleep, getting our next cargo aboard, and wading through the heavier-than-usual stack of paperwork. During that time, Chen tried twice to sneak off the planet. Both times, the transports were forced to return after an hour's worth of trying failed to get them a flapblack wrap.

By the time we buttoned up the rumors about her were just beginning to be heard, and as we headed for deep space I found myself wondering if she would be able to find passage on a transport even after her internal exile was over.

To my lack of surprise, I discovered I didn't really much care.

"Hi," Rhonda's voice came from the dayroom door. "Got a minute?"

I looked up in mild surprise, deciding to pass on the obvious retort that when TransShipMint got done with me I would have all the time in the world. "Sure," I said instead, waving her toward one of the other chairs at the table. "You come here often?"

"Hardly ever," she said, sidling over to the indicated chair and sitting down. Her left hand, I noticed, had stayed out of sight behind her the whole way, as if she was hiding something behind her back. "But I wanted to talk, and this seemed a good time to do it."

"Sure," I nodded. "What about?"

She nodded down at the reader on the table in front of me. "Working out how to pay off the TransShipMint Corporation?"

"Trying to work it out," I said, sighing. "Really just going through the motions. There's just no way I can raise that kind of money that fast."

"There was one," she reminded me. "I hear Chen offered to unbury your other account if you'd get Peter to let her off the hook with the flapblacks." She cocked her head slightly. "I wanted you to know I was very impressed that you turned her down. So was Jimmy, by the way."

I snorted. "Thanks, but impressing the two of you was pretty far down on my reasons list. We needed to scare her, and scare her good, or we'd have had her and the whole Chen-Mellis family hanging over our heads for the rest of what would have probably been depressingly brief lives. This way . . . well, at least we all have a chance of living through it."

"Assuming self-preservation outweighs her sense of vengeance," Rhonda pointed out soberly. "*And* assuming she doesn't figure out what's actually happening."

"I don't think there's any chance of her doing that," I said. "She doesn't even know about the InReds, let alone how they interact with younger flapblacks."

Rhonda shivered. "I guess it just feels too much like a magician's trick," she said. "Peter creates the illusion that a whole Galaxy's worth of the flapblacks are deliberately and actively snubbing her; when really all it is is a single Ancient InRed who's been persuaded to hang around her when-

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ever she leaves the planet. It just seems so fragile, somehow."

"Only because you know how the trick's being performed," I pointed out. "And because you know that it would only work on a world like Parex where there's a single spaceport and no more than one ship leaving at any given time." I shrugged. "Frankly, if there's any magic in this it's that Peter was able to persuade one of the InReds to cooperate this way in the first place."

"Yes," Rhonda murmured. "It's rather sad, really, having to spend its last few weeks of life sitting on Chen instead of getting to listen to the *Freedom's Peace*'s music."

I smiled. "Oh, I don't know. You didn't see what they did to Chen during her last day in prison. Where were you, by the way?"

"I was working out a deal with Suzenne," Rhonda said, frowning. "What did they do to her?"

"Nothing much," I said, frowning at her in turn. This was the first I'd heard of any deal. "They just played one of the InRed's favorite melodies over and over again on her cell's speaker system. Knowing how *my* mind does things, I figure that tune will be spinning around her mind for at least the next month. What deal?"

"Oh, that's nasty," Rhonda said. "Brilliantly nasty. Gives the Ancient something to listen to, and probably helps him identify her, too. Your idea?"

"Peter's," I said. "What deal?"

"Oh, it wasn't anything much," she said casually. "You remember how much Suzenne liked my beadwork? Well, I sold her my entire stock. Beads, hoops, pattern lists, fasteners, needles, thread, looms, finished items—the works."

"Congratulations," I said, feeling obscurely disappointed. After all of that buildup, I had expected more of a payoff. "She'll be a big hit at their next formal concert."

"I think so," Rhonda agreed. "She was already talking about getting one of the fabricators retasked to making a fresh supply of beads."

"Sounds great," I said, frowning. Rhonda, I suddenly noticed, still had a twinkle in her eye and seemed to be fighting hard to keep from grinning. "So OK, let's have it."

"Have what?" she asked, clearly determined to drag it out a little more.

"The big punch line," I said. "What did she do, offer you a 50 percent commission or something?"

"No, of course not," she said. "How in the worlds would I collect on something like that, anyway? No, I insisted on cash."

Her hand finally came around from behind her back, and I saw now that she was holding a small wooden box like the kind Bilko kept his poker chips in. "And that's exactly how she paid," she concluded. "With cash."

I frowned down at the box. It was one of Bilko's poker containers, all right. Clearly, there was something significant here I was missing. "OK," I said. "Cash. So?"

Rhonda rolled her eyes. "Cash, Jake. The only kind of cash they use on the *Freedom's Peace*. . . ?"

And with a sudden jolt I had it. *Cash.*

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Reaching over, I unlatched the lid and flipped it up. And there they were, neatly stacked in the velvet padding: a triple row of shiny golden coins. United Jovian Habitat dollars, one hundred thirty years old each. A currency that hadn't been minted since the Habitats were reabsorbed by Earth over a century ago.

I looked up again at Rhonda. "How many do you have?" I asked, my voice quavering slightly.

"Enough," she said quietly. "I checked a couple of numismatic files on Parex, and it looks like they'll pull in somewhere between a hundred fifty and three hundred thousand neumarks." Reaching across the table, she pushed the box a few centimeters toward me. "They're yours."

There are times in every man's life when pride demands he argue. Far past the end of my financial rope, I knew this wasn't one of them. "Thank you," I said.

"You're welcome," she said. "For all our faults, we're a pretty good crew. It would be a shame to break a team like this up."

I smiled wryly. "Even Jimmy and his youthful impertinences?"

"Listen, buddy, those youthful impertinences stood up with you against a member of the Chen-Mellis family," she reminded me tartly. "And whether he's willing to admit it or not, I think your moral stand back on the *Freedom's Peace* impressed him a lot."

"I suppose," I said noncommittally. Still, I had to admit in turn that Jimmy's willingness to accept my judgment had impressed me, as well.

Not that I was willing to admit it out loud, of course. Not yet, anyway. "Still, it's sort of a pain. The problem with moral leadership is that you have to keep being moral for it to do any good. I liked it better when I could get what I wanted by yelling at him."

"Yeah, right," she said, patting my hand in a distinctly sarcastic fashion. "Don't worry, though—I'm sure you'll be able to handle it."

She smiled slyly. "I, on the other hand, being a lowly engineer, have no need of leadership of any sort, moral or otherwise." She tapped a fingernail against the box of coins. "And I'll tell you right now I intend to take utterly shameless advantage of you over this."

"Ah," I said, scooting my chair over to the cooler. "So, what, you want me to serve you a drink?"

"That's a start," she purred. "And then we're going to sit here together, all nice and cozy, and I'm going to tell you all about the wonderful new engines you're going to buy for me." ■

Stupidity is its own reward.

—Dr. Donald Gilbert Carpenter

To live effectively is to live with adequate information.

—Norbert Wiener

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Saturn Rukh, Robert L. Forward, TOR, $22.95, 317 pp. (ISBN: 0-312-85417-2).
Blue Limbo, Terence M. Green, TOR, $22.95, 253 pp. (ISBN: 0-312-86282-2).
Tomorrow and Tomorrow, Charles Sheffield, Bantam, $13.95, 377 pp. (ISBN: 0-553-37808-2).
Promised Land, Connie Willis and Cynthia Felice, Ace, $21.95, 362 pp. (ISBN: 0-441-00405-9).
The White Abacus, Damien Broderick, Avon, $12.50, 342 pp. (ISBN: 0-380-78559-5).
Trader, Charles de Lint, TOR, $24.95, 352 pp. (ISBN: 0-312-85847-7).
The White Papers, James White, NESFA Press (P. O. Box 809, Framingham, MA 01701), $25, 399 pp. (ISBN: 0-915368-71-4).
Asteroid: Earth Destroyer or New Frontier? Patricia Barnes-Svarney, Plenum, $25.95, 292 + xii pp. (ISBN: 0-306-45408-4).
The Martian Chronicles, Ray Bradbury, Avon, $15 (hb), 268 pp. (ISBN: 0-380-97383-9).

Hard science fiction in the Hal Clement vein has never been very plentiful, not even in these pages. There just aren't that many Hal Clements.

Think about it. Clement was renowned for hewing very close to the line of known science, for setting up problems that depended for their solutions on the laws of physics and chemistry, and then following that dependence rigorously. In the process, he pretty well defined the "hard SF" sub-genre.

Who's living up to Clement's standard today? Charles Sheffield? Greg Benford? Doug Beason and Kevin Anderson? Sometimes. The rest of the time, these writers—who are known for their hard SF—share a widespread tendency to reach for "unknown science," to reach for future breakthroughs, even to quote Clarke's Law ("A sufficiently advanced technology will look like magic to us") and make up whatever they need for the sake of their story.

I think Hal Clement would consider that cheating.

So might Robert L. Forward, whose inclination to find wonders of adventure and technology on the cutting

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edges of today's science has given us a number of very interesting hard SF novels. The latest is **Saturn Rukh**, in which half a dozen intrepid astronauts are offered a billion bucks apiece to fly to Saturn, descend into the atmosphere, hang their ship from a balloon, and run a prototype fuel factory long enough to manufacture the fuel they will need to come home. High risk is the reason for the big payday. If they crash, if they blow it, if the factory murphies on them, they don't get back and they don't get paid.

The characters are just barely human enough to hold our interest until the expedition reaches Saturn. They have problems—one has a fondness for alcohol, one has a materialistic wife back home who is trying as hard as she can to spend the whole gigabuck before hubby dear even gets to Saturn, one likes or needs sex a bit too much, one is an ecofreak—but Forward doesn't allow any of the human problems to interfere with the mission.

Initially, Forward puts most of his energy into describing the ship and the processes involved in the mission (the book even has tables of data, diagrams, and a bibliography). Once on Saturn, however—though apparatus and process remain major foci—things get more interesting. Saturn has life, you see, much of it built around natural balloons, some of it jet-propelled, and some of it delta-winged predators large enough for one to swallow their balloon and leave them resting on its back.

Now they've got problems. First they must pry their nuclear reactor—which is supposed to hang far below them on a cable—out of the monster's windpipe. Then they have to learn to talk to it. And when the reactor goes pfft and the fuel factory can no longer make fuel . . . Well, let's just say some major ingenuity is called for, as well as some impressive derring-do at the end.

For me, *Saturn Rukh* has two great drawbacks. One is the characters, whose human sides have a tendency to emerge only when things are quiet, just to keep the reader from losing interest. The other is that though the intrepid adventurers don't save themselves by cheating (perhaps by cobbling a warp drive out of two flashlight batteries, a paper clip, and a microwave oven), they do have a tendency to wait till the last possible moment to remember something they should have had in mind all along. After all, these are supposed to be smart folks.

But never mind. If you like hard SF in the Clement mode, you'll love this one.

Way back in October 1988, I reviewed Terence M. Green's *Barking Dogs*, saying that you would be sure to enjoy it if you remembered fondly Mickey Spillane's style of vigilantism. I can say the same thing for the sequel, **Blue Limbo**, still set in a near-future Toronto (though Terence no longer pegs the year as 1999—the changes in weaponry he requires just aren't going to happen in the next two years), still starring cop Mitch Helwig.

Helwig has just blown up a warehouse that served as headquarters for a major underworld operation. He has cost the crimelords billions. And now

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he learns that he and Captain Karoulis, who helped him, are about to be canned. Actually, their fate is supposed to be worse than that, as they learn when they step away from Karoulis's desk and a bomb goes off under it.

Obviously the fix is in. High-up cops are so crooked they can look up their own . . . ahem! And Helwig, separated from his wife, desperate to maintain the bond with his daughter, moving cast-off furniture from Karoulis's garage to his new apartment, realizes he is being followed.

If you recall *Barking Dogs*, you know what has to happen. Helwig is a berserker quite in the Viking tradition. Give him his toys—the Barking Dog device that tells its wearer when another is lying, laser rifles, bombs—and get him mad, and then stand back. Evil-doers will do evil no more, for they will be dead.

What's the new toy this time? Blue Limbo, a technology for hooking a dead person's head to life-support machinery and stimulating the brain. For up to four weeks, it can hold conversations, close out old relationships, say good-bye. If death came by murder, the head can name the killer.

What gets Helwig mad? His wife and her lover, for two, and he shows his vigilante madness here. But crooked cops, and the murder of his friend Karoulis, and the kidnapping of his father from the old-age home, and when Karoulis's post-mortem head is asked, "Who did it?" Helwig gnashes the rim of his shield and goes forth to battle.

What then? Think Spillane. Think super-hero comic book. Think, "Gee, this would make a great movie, wouldn't it?"

And yes, as I fretted almost a decade ago, it seems to mean that *Barking Dogs* began a series. This is unfortunate because *Barking Dogs* stood alone very well, and the sequel—even though it too is an entertaining novel—inevitably dilutes the earlier book's impact and necessarily has less of its own. Perhaps this is why *Blue Limbo*'s jacket copy doesn't mention *Dogs*, and indeed suggests that *Limbo* is "something entirely different."

Of course, if you don't remember *Barking Dogs*, the above remarks are irrelevant. Ignore them, and have fun.

Charles Sheffield's **Tomorrow and Tomorrow** is a high-tech, Stapledonian love story. Drake Merlin is a musician of immense promise. He is also married to the passion of his life, Ana, and when she becomes ill with an untreatable, fatal disease, he can think of nothing but clinging to her as long as possible, in hope of some miracle that will restore her to him. When she dies, he has her frozen. Then he devotes himself to earning large amounts of money by exploiting his talent for music. Art no longer rules his life, but show biz. He also puts great energy into learning all he can about his contemporary musicians, writing articles that always hint that the writer knows more secrets than he reveals. When he is ready, he enters the freezer himself to await Ana's cure; he is sure he will be one of the few chosen for thawing because of those secrets he has collected; he ex-

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pects to be viewed as a rich resource by some future historian of music.

And so it comes to pass. Unfortunately, when he is awakened, there is so far no cure for Ana's disease and the corpsicles inherited from the past have all been removed to Pluto. He serves out his indenture (he has to pay for his revival somehow; his material wealth became irrelevant long ago) and goes to Pluto with a mad scheme that cruelly backfires: now Ana *cannot* be cured until the Big Crunch at the end of the universe.

"So be it," he says. "Freeze me again. Wake me then." But events conspire against him; all human civilization is threatened, and he is awakened in hope that his primitive, barbarian mind can come up with a way to ward off the foe.

Drake Merlin—note the surname, and the myth that the original Merlin went to sleep until he would be needed again—is a tragic, heroic figure, flawed, obsessed, quite Arthurian in his devotion to his Lady and his eternal defense of Civilization. He's also nuts, but if you were ever able to suspend your disbelief for the old tales of Camelot, you'll have no trouble here at all.

Connie Willis and Cynthia Felice give us a very different and more conventional love story with **Promised Land**. Far in humanity's space-going future, the world of Keramos hosts a human agricultural colony and considers what to do when the developers and land speculators move in. The answer is a system of land tenure designed to keep land in the family and make quick sell-outs difficult. Now meet the elegant young Delanna, sent offworld for a first-class education when she was five. Now her mother is dead, the farm is hers, and her plan is to sell it off, collect the cash, and return to high society.

Waiting to collide head-on with Delanna's plans is that land tenure system. Long, long before she had any say in the matter, she was betrothed to the neighbor boy. When all four parents are dead, the two are automatically married. And she can't just run when she spots this loathsome hick—the law says that in order to have any hope of selling out, she has to live on the farm for a while.

You get the picture. Girl meets boy and then has to stick around long enough to discover the boy's charms, in which he is surprisingly rich. And to be sure you don't miss the real point, Willis and Felice provide a subplot concerning Delanna's treasured pet. "It's not a bug!" she insists, but it looks like one to everyone else, and the subplot insists that a low-class bug can turn into a high-class mandarin if it just acts like one.

Not subtle, not complicated, but nicely done and well suited to younger readers.

It has been most of a decade since anything by Australian Damien Broderick last came my way. That was *Striped Holes,* which in August 1989 I called entertaining, thin but fun.

His latest novel, **The White Abacus**, is by no means thin, and it's especially fun if you're a Shakespeare fan. What Broderick has done is to rewrite *Hamlet,* and in this respect he has

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committed a tour de force, ambitious in intent and successful enough to be worthy of immense respect. However, as soon as the rewrite becomes obvious, it also begins to feel forced. As well, one starts hunting for the *Hamlet* parallels, which tends to distract one from Broderick's own story.

The setting is a far future in which "humanity" is divided into the organic hu and the electronic ai (artificial intelligences). On Earth—and everywhere in the universe that the teleportational Hex gates can reach—the two kinds live together very happily. Among the asteroids, however, live old-fashioned hu: violent, emotional, scheming, and excluding the ai. On Earth, the ai Ratio is born into corporeality and assigned to befriend and report upon the asteroidal prince Telmah Lord Cimah (and do please take a backwards look at that name), there for his education in preparation for his ascension to the Directorship of Psyche, currently held by his father, Lord Orwen. But suddenly Papa is dead, slain by wicked, ruthless Uncle Feng, and Feng has married the widow and seized the Directorship.

Telmah must hie homeward, Ratio in tow, to marry his sweetie and defeat Feng. The obstacles to his intent are both psycho-political (as in the original) and very, very sfnal. For one thing, the asteroidal hu do not use Hex gates, for they believe to do so is to lose one's soul (which resides in the vermiform appendix, so one should never have that organ removed). Telmah must therefore travel the slow way, though his actor friends, who will in due course present a little play for Feng, can Hex at least part of the long route.

Broderick is endlessly and fruitfully inventive in pursuit of his story. The worlds of his hu and ai are richly detailed, as nearly convincing as anything in SF, and his adherence to the Shakespearean canon is neither absolute nor slavish. The result is a marvelous tale. It is also one that could well provide meat for a master's thesis or two, devoted to documenting all the parallels with the original *Hamlet,* and all the spots where in the interests of his own story Broderick has departed from the model.

Recommended.

Charles de Lint is in top form with **Trader**, which opens with luthier (guitar *[etc.]* maker) Max Trader awakening in the body of ne'er-do-well Johnny Devlin. Max is a successful fellow, his work much in demand and money in the bank. Johnny is a bum, his plastic loaded to the max, in hock to his landlord, and totally blind to the notion that one succeeds not because things "work out" but because one *works* them out. He thinks the switch is a good deal, for he now has a nice apartment, a going business, and money in the bank. Fat city.

Max isn't so happy. In fact, he's downright ripped, especially when Johnny's girlfriend Tanya and her roommate Zeffy show up on his doorstep to demand the rent money he had "borrowed" from Tanya, and then when the landlord changes the locks, turning him into a street person. And no one believes him, except—sort of and reluctantly—Zeffy,

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who thinks his manner really isn't Johnny's.

But Tanya isn't real happy that Zeffy seems to be turning on to her scumbag reject. Next door to Max's old apartment—now belonging to Johnny, in Max's body—teen Nia, friend of the old Max, learns that her mother is turning into a lesbian, freaks out, and runs. Meanwhile, Max acquires a stray dog, Buddy, meets Bones—a Kickaha fortune-teller who has a good deal of Coyote in him—and learns to whittle for his supper. And . . .

Well. The theme is the changes people undergo in their lives, and why. Things don't just happen, says de Lint. There are reasons, causes, even in something as drastic as the Max-Johnny mind switch, for though Johnny was wishing desperately to escape the conditions of his life, nothing would have happened if Max hadn't been dissatisfied with his life as well. Those causes are rooted in the spirit world, land of dreams and yearnings. And when Max and Johnny vanish into that world, Zeffy, Nia, and Buddy must go a-questing.

There are hazards in such quests, traps for the unwary and the weak. Do the questers evade them? De Lint will have you thinking they don't, but you're perceptive folks. You'll notice that there are still quite a few pages to go at that point, and you will expect a happier resolution. You'll even get it.

And you'll be happy you bought the book. De Lint is a master of urban fantasy, given less to action than to character and mood and setting, and he always leaves you looking forward to his next.

* * *

NESFA Press's "NESFA's Choice" series is dedicated to bringing "back into print classic science fiction that is essential to any good collection, but which is becoming increasingly difficult to find as the publishing industry's backlist shrinks." The books of the series are printed on acid-free paper and solidly bound, and NESFA says it plans to keep them permanently in print. The latest in the series is James White's **The White Papers**, published to honor his appearance as Guest of Honor at the 1996 World Science Convention in Los Angeles. It includes a quite justifiably laudatory introduction by Mike Resnick, four stories from the Sector General (interstellar hospital) series for which he is best known, five non-SG tales, including a quite touching ghost story, "House Sitter" (never before published), and an ample sampling of fan writing by and about him. That last category may be the most interesting to North Americans, for White is an Irishman and has been a major figure in Irish Fandom since its founding in the 1940s, and partly because of him, Irish Fandom has been a prankish, antic thing. His comments on encountering such visiting notables as the young Robert Silverberg, John W. Campbell, Jr., and more, are also worth a peek.

For Sector General fans, the book contains White's own account of its genesis and development ("The Secret History of Sector General," revised for this volume after its original appearance in 1979) and fan Gary Louie's SG timeline and description of

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the classification system.

Patricia Barnes-Svarney's **Asteroid: Earth Destroyer or New Frontier?** is a competent, readable survey of the history and nature of asteroids, with a good deal of attention for what they mean for us. That is, this book doesn't just consider that zone between Jupiter and Mars occupied by the Asteroid Belt so beloved of SF; it also considers the eccentrics, the Earth-Crossers, related comets, and craters on Mars, Moon, and Earth, and it stresses that those craters indicate colossal releases of energy. Indeed, in a world as crowded as our own, the sort of impact to be expected every 5000 years (on average) would kill many millions of people. Larger impacts—they have happened, and we can be sure they will happen again, but we cannot now know when—could destroy human civilization, the human species, or even life on Earth.

It thus behooves us, in the spirit of Pascal's Wager (believe in God; if there is none, you lose a little time; if there is one, atheists lose big time), to keep a weather eye on the skies and prepare the necessary apparatus for shunting even a large rock away from us. And let's not forget the potential value of asteroids as sources of raw materials for industry on the ground and in space.

Barnes-Svarney slips only when she steps briefly from her own fields of astronomy and geology to repeat that old chestnut about species going extinct because they wear out. Aside from that, she clearly knows her material quite well, and her book is an excellent guide for the nonastronomer.

BOOKS ON DISK

The latest on-disk book to reach me from Mark Owings (1113 West 40th Street, Baltimore, MD 21211-1749) is **Memoirs of The Year Two Thousand Five Hundred**, by Louis-Sébastien Mercier. The book, first published in 1770 as a utopian exposition of Enlightenment ideals of Order, Justice, and Happiness, later the first utopia published in the US (in 1795), and reprinted by Gregg Press in 1977, is virtually unreadable, but it is very much of historical interest. According to the Clute-Nicholls *Encyclopedia of SF,* Mercier was "best known for his numerous plays and anecdotal journalism . . . was active in the French Revolution, being imprisoned during the Terror [and this book is] important particularly for any analysis of pre-Revolutionary ferment in France." And you can't beat Owings's price of $1 per disk, plus $1.50 shipping and handling.

NOTABLE REISSUES

Ray Bradbury's **The Martian Chronicles** first appeared in 1950 and gave science fiction a lyrically enchanting voice such as it had never had before. It established Ray Bradbury as one of science fiction's most public figures, known to folks who had never heard of Heinlein or Weinbaum or Williamson and thought of SF—when they thought of it at all—as "that Buck Rogers stuff."

And all that without a shred of the plausibility we so fondly think essen-

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tial to "real" SF: a habitable Mars, humans coming as they once did to the American West, settling, building, dreaming.

Have you forgotten how he did it? Are the books so old and you so young that the two of you have never met? Then buy a copy of this new hardcover edition, which comes with a new introduction and an added story, the 1972 "The Wilderness." Buy two, and give one away.

And reflect that the time for this reissue could be no better, coming on the heels of 1996's announcement of hints in Antarctic meteorites that once upon a time, long, long ago, Mars may indeed have cradled life. ■

IN TIMES TO COME

A sizable part of our September issue, by pure happenstance, might seem to some to constitute a "theme" collection, with at least three novelettes and a short story exploring quite different variations on interplanetary exploration and interspecies contact. Maya Kaathryn Bohnhoff's "Ask Arlen" is a highly amusing tale of How It Might Happen Here, with a visitor finding a most surprising way to "fit in." Pete D. Manison's entry is also Earth-based, but with Manison's offbeat imagination at its unfettered best; I won't even tell you its title till you're ready to read it, but I will say that I'll bet you've never seen quite this form of contact before! G. David Nordley's collaboration with Jonny M. Duffy is a more serious story of human explorers on a planet that features a very insidious, very alien, yet not totally unfamiliar danger.

Dr. Stephen L. Gillett's science fact article also has an oblique connection with the contact theme. The likelihood of contact depends crucially on how abundant planets conducive to life are. It has long been common, in scientific speculation about that subject, to assume that our Sun is a very average star—the "assumption of mediocrity." But it *is* an assumption, and not necessarily true. Now that we're beginning to get some direct observations of other planetary systems, Dr. Gillett is in a position to take a fresh look at the question: "Just how average is the Solar System, anyway?"

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Dear Stan,

. . . Everyone is entitled to make his or her choices about what to believe. . . .Here's one zealous Christian who *loved* hearing again the ideas in this editorial (December 1996). Even though you weren't talking about religion, what you said applies also to religious evangelism.

I like the term evangelism, but a healthy definition needs to include the idea that people must be respected in coming to their own convictions, and that selling an idea is not about forcing people to a certain belief but about sharing my "good news" with others who are interested in hearing it so that *they* can use it as part of the data *they* work with in forming *their* convictions.

I think this can be a frightening thing to do because it means letting go of trying to control the outcome. It just may be possible that someone might take in all my "good news" and not arrive at the same conclusions as I have. When this happens it raises the possibility that if I were to listen to what they have to say and think about it seriously, I might just end up deciding to reevaluate my own convictions!

If I'm not willing to do this work with my convictions, then I really don't have convictions, I just have prejudices and I have no right trying to force my prejudices down someone else's throat.

The tool I use to determine whether I am operating from a conviction or a prejudice is to see what kind of gut reaction I have when I meet an articulate person with contrary views. If I feel excited and interested in a dialogue then I probably have convictions in this area. If I feel fear, anger, hatred or a need to "shut them up!" then I probably have prejudices.

RANDI KEEFE

starchild@kali.nas.com

Dear Dr. Schmidt:

Regarding the editorial in the May 1996 issue, and the letters in the December 1996 issue: It appears that an awful lot of people don't really understand history or systems.

The "Dark Ages" were dark because those in charge of Western Europe refused virtually all communications with their neighbors and the rest of the world, except at sword point. There were tremendous advances in all fields of human endeavor during that period, all over the world, but without printing presses and the Internet, communications (in Western Europe) were limited to word-of-mouth of itinerant rabbit-hunters and tinsmiths. The so-called Renaissance was more the result of the release of "inexpensive" books (and their embedded ideas) than of a change-of-mind of the bosses (not necessarily the leaders).

Another complication in the editorial and the two letters is the concept of

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"ecology" as a condition, rather than as a process. All systems change over time: if they didn't, they wouldn't work at all. Human memory is a system, and is subject to this rule. Our current (October 1996) brouhaha is not about how we will advance our society, but about how firmly the bosses of our society can turn back the clock to when they think they (not all of us) were happiest (least required to think). The purpose of youth is to kick over the fences of the present, and invent other paths.

As for Harry Stine's "Alternate View" (December 1996): Right on, especially the comment about the discomfort of the Francophones. It should also be kept firmly in mind that one of the purposes of technical terminology is to maintain elitist "priesthoods" that can, through their verbiage, retain control of the "system."

I've been reading science fiction, history, and "great books" for as long as I have been able to choose. My wife objects to my 30-foot stack of *Analog* solely on the basis of space in our domehouse. Heaven forbid that changes stop, or even slow down.

JAMES HARRIS

Freeport, FL

Dear Dr. Schmidt:

As a Brazilian I found Joseph H. Delaney's "The Lily Gilders" (December 1996) interesting, even though the story didn't really add to the growing body of good Anglo-American SF stories set in or mentioning Brazil—a body which includes works by Orson Scott Card, J.G. Ballard, M. Shayne Bell, Thomas M. Disch, and Patricia Anthony.

I've detected just a tiny error when Delaney writes of a "provincial police" (page 56). Brazilian territorial division is based on states and not provinces, just like the US. Picking up this trivial error probably means I unfortunately agree when the author writes of corruption in Brazilian government. I would have welcomed more of a landscape characterization in that story, too.

What truly bothers me in the story is that it seems to say things like greed, pollution, and even corruption may go on destroying randomly, but science will eventually fix it up. I wish I could believe it.

ROBERTO DE SOUSA CAUSO

Brazil

Brass Tacks,

The story on page 42 of your January '97 issue, "Business As Usual, During Altercations," really sucked! The reason why we have terrorism is *because* of politicos like "Sumpter" who run roughshod over the liberties of his own citizens and citizens of other countries. Not everybody thinks free trade between willing buyers and sellers is evil! All the while reading the story, I was rooting for the "terrorist" and hoping that he would drop his bomb on Washington D.C. wiping out the "world's largest organized crime syndicate" (from a story called "State Of The Union" in an earlier issue). When the terrorist demanded that the U.S. redeem its money for gold without question, upon demand, and Sumpter said "NO," it was like I owed you money but refused to pay you, and you demanded that I pay you and I said "NO." It was right there that I knew that

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Sumpter was as evil as the terrorists he was up against. At least the drug terrorists were only fighting for what was theirs! I was really disappointed at the ending when this socialist President beat the capitalists/ terrorists. Some people think that if the government stops imposing its morality on people (like with drug "smuggling") terrorism would stop and progress would speed up. This is *not* because of the old argument that we can't stop it so we might as well accept it. This is because what people choose to do together *is their right!!!* I really thought there would be a surprise ending at the end with Sumpter changing his mind and saying how freedom is good. This author is an enemy of freedom. Please don't run any more stories by him!

JERRY HAMLIN

Piscataway, NJ

Dear Dr. Schmidt,

Thanks for your January 1997 issue, one of the most provocative collection of stories I have seen in *Analog* so far. "Last of the Soft Things" by s.c. virtes disturbed me because, while the author obviously attempted in good humor to extrapolate the effects of our liability laws to ridiculous lengths, the resultant extrapolation ended up seeming all too realistic.

What I found most troubling was the ending of Joseph Delaney's "Business as Usual, During Altercations." A clue to my disquiet may be found in Jeff Hecht's, "A Life of Its Own," in which the moral implications of a great experiment were never accounted for. "Business as Usual" describes a series of events leading up to a pure global democracy, which is portrayed in the story as a Good Thing.

It may well be, but I doubt it. The problem with a pure democracy as described in the story, is that minority rights, in particular *individual* rights, can take a back seat, or get tossed out all together, at the moral whims of the majority. As Robert Heinlein once wrote, has history recorded *any* incident when the majority was right?

It is quite conceivable that a voting majority could decide, say, that a pregnant mother must complete her term regardless of the danger to her health, or that certain objectionable things should not be published, or that scientists cannot be trusted because the Majority doesn't understand what they do, or that one religious ideology is the "correct" one to be taught in schools, or that gays shouldn't raise their own children (a point addressed nicely by Stephen Burns's "The Wait"), or rescind any number of other individual protections for arbitrary moral reasons because the majority thinks it's best.

Well, in my life at least, the majority has rarely spoken for me. A democracy like that described in the story is, in my mind, mob-rule mentality; dangerous without some balancing forces like we have in the United States: a fairly inviolate (hopefully) Constitutional Bill of Rights to prevent majority-rule disasters, and a judicial system sworn to uphold it. It appeared that the society in "Business as Usual" completely discarded the old system in favor of a pure democracy. Not a happy ending, as far as I'm concerned.

ALEX MATULICH

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The author replies. . . .

Dear Stan,

Well now! It looks like these two are on opposite sides. Clearly, I have touched a very sensitive nerve, but then I knew that before I started.

Clearly there is a different kind of political dissent over there in the east than here and I get the distinct impression that people there don't know how bad things really are and how close this world is to a really planet-shaking political upheaval.

Since we are in the prediction business I will make a few: this coming century is a watershed. We will see world government, not under the leadership of the UN or anything like the UN, but as part of a US hegemony. That hegemony will be founded on something far more potent than nuclear arms and ICBMs—money.

Money is the most fiendish, most devastating weapon ever conceived by the mind of man. It was the skillful use of money that brought down the Evil Empire, not thermonuclear bombs. This is why it is so vitally important that we get our act together now and prevent the dissipation of our economy. The race cannot afford to let organized crime and corrupt public employees continue feeding on America's corpse as they do now.

For the record, I agree with Hamlin's claim that the Washington bunch is the world's largest organized crime syndicate. Unfortunately he does not appear to understand the difference between revolutionaries and terrorists.

Matulich assumes something I didn't say, that the Constitution would be dumped. I think he would be very much more disturbed if he knew how easy it is for the present regime to violate the Constitution and how little can be done about this.

It may well be that nothing quite like my computer-monitored democracy will ever evolve, but one thing is crystal clear, nationalism was doomed the instant the Internet was organized. The 22nd century will see the rest, planetary government and world language. We already have the latter. It's English.

There will be many who will try to resist this irresistible change. No doubt some of our extinct forebears resisted the change from raw to cooked meat—and were outlived and outbred by the progressives who didn't die young from parasitic diseases.

It will be interesting to see where this thing goes. Without controversy both of us would be out of work.

JOSEPH H. DELANEY

Dear Stan:

I just read your January '97 editorial about *Scientific American's* questionable coverage of nanotechnology, and Ralph Merkles rebuttal that the Foresight Institute published on the Web. I am pleased to inform you that Ralph Merkle's rebuttal initiated an extensive debate with many participants (including *Scientific American*). The Foresight Institute has recorded the debate in full detail on the Web. The debate is rich with point and counterpoint, refutation and counter-refutation, all linked together with the effectiveness only hypertext can enable; Foresight has organized the materials with a summary and table of contents, and has commit-

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ted to preserving the debate on-line. This is the best example of discourse between contending points of view yet captured on the Web.

Dr. Eric Drexler and I have both asserted for years that hypertextual discourse would change the nature of debate (see Dr. Drexler's comments in the Foresight/*SciAm* debate itself, and you may remember my article on "Hypermedia and the Singularity" in *Analog*—January 1989). It is exhilarating to see our predictions finally coming true. Anyone who wants a glimpse of the future of argumentation should check out this preview at www.foresight.org.

MARC STIEGLER

Dear Mr. Schmidt:

As always, I thoroughly enjoy your magazine. I do wish to make one comment regarding the end of "Business as Usual, During Altercations." I can't call this a criticism. I also believed that the only impediment to direct democracy on a large scale was logistics, which could easily be solved by technology. I changed my mind after reading a very compelling article in the November 1996 *Discover* ("Math Against Tyranny," Will Hively).

The author clearly explained, using mathematical supporting arguments, how a representative system prevents democracy from becoming a tyranny of the majority. In simple terms, the bigger the group, the less weight any one vote has. In a country the size of America, even a sizable majority could be powerless. The odds of an election being so close that a single vote, or small group of votes, would make the difference is vanishingly small.

In that situation, the raw majority always wins, and need not pay any attention to the concerns of minorities.

In a representative government, the population is broken into smaller groups, so that each vote or group of votes carries more weight. The representative at the grass roots level cannot afford to offend a sizable minority of his constituents. He must make some accommodations to their needs.

This representative then becomes one voice in a smaller group at the next level up. Because the group is smaller, he has more power to represent the needs of his constituents—including the minorities that would have been lost in the great sea of the popular vote.

The representative system strengthens minority representation and moderates the majority. This is not best accomplished by gerrymandering for minority representation, either. Example: A city with seven council members, chosen by district. If districts are drawn to group minorities together in one district, they will be guaranteed one seat on the council. However, the other six council members may care nothing about their issues. On the other hand, if districts are drawn so that the minorities are spread among three districts, they will have sizable influence, albeit not absolute control, over three council seats.

I can't explain it as eloquently as Mr. Hively did, but he certainly convinced me, and I would invite anyone else interested in the direct vote vs. representative government issue to read the article.

Again, thanks for a magazine that

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provokes thought and discussion on issues of this kind, while entertaining the reader as well.

SHARI PRANGE

Santa Cruz, CA

Dear Dr. Schmidt:

Your editorial "The All or Nothing Fallacy" in the February 1997 issue of *Analog* is, as almost all of your editorials are, thought-provoking. I offer the following observations and thoughts on the ideas you presented.

First, I would suggest that while cultures may undergo certain philosophical oscillations, they are rarely to an extreme in any direction. The very complex factors that operate in any social system seem, to my observation at least, to act to reduce the amplitude of the swings that a society might experience, automatically, as it were, to negate an All or Nothing result. In the second place, "using our brains" to rationally discriminate and make life better is, in my view, the exact cause of oscillations in social philosophy, and, therefore, is unlikely to work to the general good.

Taking a very broad view of historical societies, a segment of the philosophers of any age usually pronounce that the society is going to hell in a handcart, propelled by a general lack of attention to detail and discipline—usually on the part of the youth. At the same time another group of philosophers are equally convinced that the society is too repressive, is not progressive enough, and will soon go to hell in a handcart. Successively, the Chinese, Sumerian, Babylonian, Egyptian, Phoenician, Greek, Roman, and other social philosophers down to the present have so argued. Perhaps that none of the ancient societies presently exist substantiates their views, but I think there were, again, more complex causes at work. All of the while the various societies were really going to hell in a handcart, day-to-day social custom and convention was taking the vector of the middle ground.

I have a feeling that social oscillations are really a reflection of the success of any particular society and not the cause of the success. Roman culture seems one of the better documented cases-in-point. At the height of the Empire's power, the internal structure for satisfying the society's need for shelter, food, water, waste disposal, and communication reached a high level that would not be replicated in Europe or the "middle east" for fifteen hundred years. There was little internal threat to the social structure, and the external pressure of border instability was remote. For a while a wide range of social philosophies could be accommodated without perturbing the entire system. The drift toward the dissolution of the Empire seems more the product of inattention to the fundamental maintenance of social organization than of swings in social philosophy.

In regard to individual freedom, accountability, and the ability to determine what is relevant to doing a good job, my feeling is that in those areas where reliability, accuracy, and responsibility are mandatory, high standards will invariably hold. Your examples—surgeon, airline pilot, writers with deadlines, et al.—are proof that

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less than perfection in the execution of these tasks is not permissible. The users of these services will drive out the less capable and undisciplined, although there will be a cost of finding out which individuals are lacking in skill. While it technically doesn't matter what color shoes an airline pilot wears, a failure in one area of personal habit often is reflected or carried over to others. The practice of imposing uniform behavior patterns on people is a cheap, empirical way to instill and assure that the behavior in required areas has a better probability of being sustained.

To me, the "anything goes" attitude is an extension of deciding what is appropriate to the getting-the-job-done-and-don't-bother-with-the-unessential syndrome, carried to extreme. Some very good surgeons and lawyers that I know are really good in their professions, but they are rude, drive dangerously, have imperious attitudes toward others of their species, disrespectful of any authority other than the AMA or ABA, and are generally lousy parents. These are highly educated, skilled persons of significant benefit to society. But they seem to have taken the process of deciding what is essential to their function to a distorted end. Even though there are, indeed, details that might be considered unessential to the performance of the technicalities of certain professions and functions, the frailty of the human psyche seems to require, no, demand, adherence to a measure of dogma, blind conformance and tradition.

Then again, I probably missed the whole point of your editorial. But thanks for it anyway.

TOM DAVIS

Chula Vista, CA

Dear Mr. Schmidt:

Despite the recent rapid advances in technology, the government continues to act as a roadblock to advances in some critical areas.

One of the commonly used animal models in AIDS research consists of a mouse with a genetically human immune system. These animals are prepared by inoculating a strain of mice that lacks an immune system with blood taken from a human embryo prior to its formation of immune tolerances. The human cells then come to recognize the mouse cells as "self" antigens, and so the organism is viable.

It occurred to me that if this technique could be used to make a mouse infected by HIV, it could also be used to make a human incapable of being so infected. This would not be difficult; one need only treat the patient with the antibiotic chloramphenicol for two weeks, which kills all the patient's own marrow cells, and then inject the animal fetal blood. There would not even be a need to type the blood. The same procedure could be used to treat leukemia, autoimmune disorders, or even transplant rejection, although in the latter case human cells would normally be used.

A few months back, due to the apparent impossibility of marketing the idea myself, I wrote the NIH about the possibility of their pursuing it. I had been prepared for a polite brush-off, but not for what I got.

Their reply referred to a line of re-

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search published in the interim, in which treated baboon bone marrow was used in an attempt to create an HIV-resistant composite immune system in a human subject. The experiment did not work, and the risk of introducing new viruses into the human population from baboons would, in the opinion of many experts, bar the FDA from approving the technique anyway.

Their letter stated that the use of fetal tissue for this procedure constituted an "advanced" development of this line of research, and that "its combination with the use of chloramphenicol toxicity is even more so." They then stated that, as a result, they would not be interested in approving even preliminary animal studies of my idea for at least ten years.

In my opinion, just because a procedure is "advanced" is not a reason to bar its introduction, especially when that procedure is the best available method of controlling a lethal epidemic. In fact, I wonder if these people may have connections in the HIV pharmaceutical industry.

The letter went on to point out that without FDA approval for animal tests, no application for patent can be accepted in the United States, even if the subject matter has been published and the deadline for patent filing is ticking, on any new medical treatment.

I am not even trying to file for a patent. I have a better idea. In addition to being (I think) the most effective treatment yet discovered for HIV infection, it is also far cheaper than drug therapy. Unlike drug therapy, it is within the cost range of at least some Third World countries, which is where most of the world's AIDS cases are located.

Which is why I am writing you this letter. I would like you to print it, to accomplish the following goals:

First, if the procedure becomes generally known, it will certainly be tried by doctors in at least some foreign nations. There is nothing the US government can do about this. Since I am not filing for a patent, they will be able to do so without paying royalties, so that a small, poor nation with a large number of AIDS cases would assuredly jump at the chance. Even if their government was hard-nosed enough to reject the procedure, their people would demand it.

Second, knowing all the above, the American people would realize that, as a result of our bureaucratic form of regulatory government, we are the only major nation on the planet, or at least one of the very few, that does not allow its citizens access to a safe and effective treatment for AIDS. Some of the wealthier victims may be visiting Nigeria or some such place for treatment.

Third, and hopefully, the public reaction to the above events will put such intense political pressure on Congress that not only will the cure be legislatively approved, but the FDA and possibly other regulatory agencies will be abolished outright.

It must be noted, of course, that this procedure is not without side effects. The patient's blood chemistry would be altered to the extent that banking his own blood would be an absolute medical necessity.

GERALD LEE SUTTON
Lawrenceville, GA ■

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UPCOMING EVENTS Anthony Lewis

3–6 July 1997
WESTERCON 50 (western North America SF conference) at Sheraton Seattle Hotel & Towers, Seattle, Wash. Guests of Honor: J. Michael Straczynski, Martin Harry Greenberg, Amy Thomson; Artist Guest of Honor—Victoria Posner-Lisa; Science Guest of Honor—Jack Cohen; Music Guests of Honor—Jeanne and Spider Robinson; Fan Guest of Honor—Walter Daugherty. Registration—$40 until 30 June 1997, more thereafter and at the door. Info: SWOC, Box 283, Seattle, WA 96111. email: westercon50@isomedia.com

11–13 July 1997
READERCON 9 (literary-oriented SF conference) at Marriott Hotel, Westborough, Mass. Guests of Honor—Algis Budrys and Kim Stanley Robinson, Memorial author: C. M. Kornbluth. Info: Readercon, Box 381246, Cambridge, MA 02238.

8–11 August 1997
MYTHCON XXVII (mythopoeic conference) at Pepperdine University, Malibu, Calif. Guest of Honor—Orson Scott Card. Theme: J.R.R. Tolkien. Info: Mythcon, c/o Dr. Michael Collings, Humanities/Fine Arts Division, Pepperdine U., Malibu, CA 90263.

15–17 August 1997
NECRONOMICON 3 (New England regional horror conference) at Marriott Hotel, Providence, R.I. Guest of Honor—Brian Lumley; Special Guest—Dirk Mosig. Info: NecronomiCon, Box 1320, Back Bay Annex, Boston, MA 02117-1320. email: hummel@netcom.com

28 Aug–1 Sep 1997
LONESTARCON 2 (55th World Science Fiction Convention) at San Antonio Convention Center, San Antonio, Texas. Guests of Honor—Algis Budrys and Michael Moorcock; Artist Guest of Honor—Don Maitz; Fan Guest of Honor—Roy Tackett, TM—Neal Barrett, Jr. Registration until 31 July 1997—$135; supporting $25; children +3 to +12 $40, children -0.75 to +3.0 FREE (age as of 29 August 1997). This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info: LoneStarCon 2, Box 27277, Austin, TX 78755-2277. (512) 472-9944 (voice), (512) 435-7747 (fax), lsc2@io.com

Convention runners: If your convention has a telephone, fax, e-mail, or Web page URL, please let us know so that we can publish this information.

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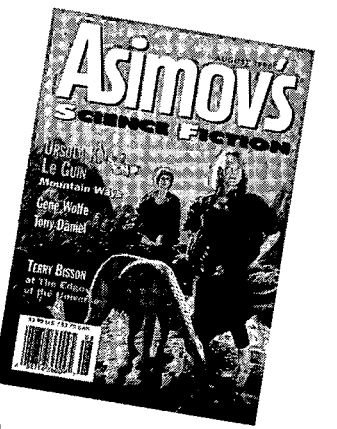

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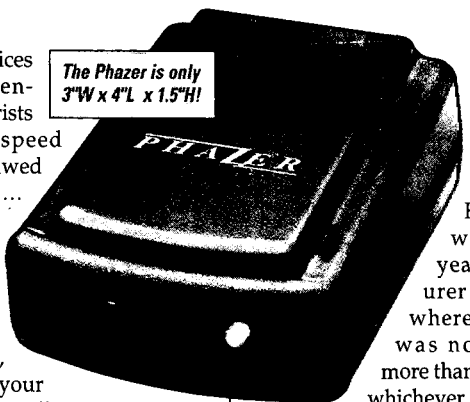
How to make your car invisible to radar and laser...*legally!*

Rocky Mountain Radar introduces a device guaranteed to make your car electronically "invisible" to speed traps—if you get a ticket while using the product, the manufacturer will pay your fine!

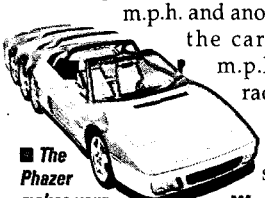


The Phazer is only 3"W x 4"L x 1.5"H!

Although devices exist that enable motorists to detect police speed traps, they're outlawed in many states... including mine.

The solution. Combining a passive radar scrambler with an active laser scrambler, the Phazer makes your automobile electronically "invisible" to speed-detecting equipment. And unless you live in Minnesota, Oklahoma or Washington, D.C., the Phazer is legal!

Scrambles radar. Police radar takes five to 10 speed measurements in about one second. The Phazer sends one signal that tells the police radar the car is going 15 m.p.h. and another signal that the car is going 312 m.p.h. Because the radar can't verify the speed, it displays no speed at all.



■ ***The Phazer makes your car invisible to police radar and lasers or the manufacturer will pay your speeding ticket!***

Works with laser, too! The Phazer also protects you from Lidar guns that use the change in distance over time to detect a vehicle's speed. The Phazer fires invisible infrared pulses through the windshield. Laser guns interpret those pulses as a false indication of the car's distance, blocking speed measurement.

Encourage responsible driving. The Phazer *is not* intended to condone excessive speeding. For that reason, within the first year, the manufacturer will pay tickets where the speed limit was not exceeded by more than 30%, or 15 m.p.h., whichever is less.

Double protection. If the Phazer sounds good, but you prefer to be *notified* when you are in range of a police radar, the Phantom is for you. Ask your representative for more details!

Risk-free. Both products are backed by our risk-free trial and three-year manufacturer's warranty. If you're not satisfied, return them within 90 days for a refund.

The Phazer . . . . . **$199** $14 S&H
The Phantom . . . . . **$349** $18 S&H

Please mention promotional code **1906-10896.**

For fastest service, call toll-free 24 hours a day

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